



**Verified Carbon
Standard**

HEBEI HAIXING 49.5MW WIND FARM PROJECT

Document Prepared by

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Hebei Haixing 49.5MW Wind Farm Project (hereafter referred to as the project) is to generate renewable electricity using wind power resources and to sell the generated output to the Hebei Southern Power Grid. The project activity generates greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions from electricity generation by fossil fuel power plants that supply the Hebei Southern Power Grid, which is an integral part of the North China Power Grid.

The project is located on the seashore of Haixing County, Cangzhou City, Hebei Province in North China. It involves the installation of 33 turbines, each of which have a capacity of 1500kW, providing a total installed capacity of 49.5MW. The expected yearly electricity generation in PDD is 114,999 MWh.

The Project started construction on 01/01/2007.

The Project started commissioning on 14/04/2008. The project started full operation on 25/04/2008.

The estimated annual emission reductions are expected to be 96,650tCO₂e during the second crediting period. This monitoring period is from 14/04/2018-25/11/2021 (1322 days in the second crediting period). The emission reductions in this monitoring period is 372,460 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectoral Scope 1, Energy industries (renewable - / non- renewable sources).

The project is a wind power project, and is not a grouped project.

1.3 Project Proponent

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1.4 Other Entities Involved in the Project

Organization name	Demeter Venture UK Limited
Role in the Project	Project participant (VER buyer)
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Title	Manager
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Organization name	Beijing Cronus Technology Consultancy Center
Role in the Project	Consultancy
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1.5 Project Start Date

14/04/2008, which is the date when the first turbine was commissioned.

1.6 Project Crediting Period

The first crediting period is from 14/04/2008 to 13/04/2018 (10 years). Therefore, the total crediting period under VCS would have been from 14/08/2008 to 13/08/2038 (30 years). However, the project was registered under CDM on 06/03/2009. And the total crediting period under CDM is from 06/03/2009 to 05/03/2030 (21 years).

According to VCS standard, the total crediting period under VCS is from 14/08/2008 to 05/03/2030 (considering 3*7 years CDM crediting period).

This monitoring period is from 14/04/2018-25/11/2021 (1322 days in the second crediting period).

1.7 Project Location

The project is located on the seashore of Haixing County, Cangzhou City, Hebei Province in North China. The geographic coordinate of the project site is North Latitude 38°13'27", East Longitude 117°45'27". The region is about 302 kilometers far away from Shijiazhuang City, the capital city of Hebei Province. The project site is about 12 kilometers far away from Haixing County, and the Haifang road passes through the wind farm.

The location of the project in Hebei province and the location of Hebei province in China are shown in the map of Figure 1.



Figure.1 The location of the project in Hebei Province

1.8 Title and Reference of Methodology

The approved methodology applied in the project activity is ACM0002 – “Grid-connected electricity generation from renewable sources (version 20.0)”¹.

Related tools are:

¹ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

- Tool to calculate the emission factor for an electricity system (version 07.0)
- Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)
- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 03.0.1)

1.9 Participation under other GHG Programs

This project has been registered as a CDM project on 06/03/2009, for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The registration number is 2007. It has issued carbon credits under CDM for five times, for which the monitoring periods are 06/03/2009-25/06/2009, 26/06/2009-25/06/2010, 26/06/2010-25/06/2011, 26/06/2011-25/06/2012, 26/06/2012-31/12/2012.

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits: The project proponent confirmed that, once emission reductions generated from 01/01/2013 to 13/04/2018 are issued under VCS rules, those credits will not be claimed as CERs and will be claimed as zero in the possible future CER monitoring report. And issued VCUs will be sold only once to one particular buyer. Once the project proponent are included in an emissions trading program or any other mechanism that includes GHG allowance trading, the VCU issuance under VCS rules will be stop immediately since the date of included in an emissions trading program or any other mechanism that includes GHG allowance trading.

Other Forms of Environmental Credit: The Project is a renewable energy generation project, which discharges no emission during operation period. Thus, the project doesn't fall into categories that creating GHG emissions primarily for the purpose of its subsequent removal or destruction. The Project has not created another form of environmental credit, which will be verified by DOE. And the Project will not create other environmental credit in the future

1.11 Sustainable Development

The project makes contribution to the sustainable development as follows:

1. GHG emission reduction

The project will help reduce the greenhouse gas GHG emissions versus the high-growth, coal-dominated business-as-usual scenario in the NCPG by reducing the electricity generation from the fossil-fuel fired power plants.

Thus, the project achieved **SDG 13 Climate Action**².

² <https://sdgs.un.org/goals/goal13>

2. Reduction of fossil fuel use and provide clean energy

The Project Activity will reduce reliance on imported fossil fuels, which will contribute to increasing China's energy security, and will also improve local air quality as it reduces the emissions of SO₂, and NO_x associated with fossil fuel use.

Thus, the project achieved **SDG 7 Affordable and Clean Energy**³.

3. Employment opportunities

The conducting of the project will create employment opportunities during the construction phase and operational period.

4. Economic Improvement

The construction of the wind farm will promote local economy by contributing to local government with more tax revenues through selling power generation.

Thus, the project achieved **SDG 8 Decent Work and Economic Growth**⁴.

2 SAFEGUARDS

2.1 No Net Harm

The EIA Form of the project was approved by Hebei Province Environmental Protection Bureau on 14/07/2006 (Document No. Ji Huan Biao [2006]118). According to the EIA Form, environmental impacts possibly caused by the Project and treatment measures adopted by the Project Owner are analyzed as follows:

2.1.1 Ecological impact

Construction Phase

1) Impact on Foliage

Most of the construction areas of the project are brine pan and the others are seashore saline soils. There is no vegetation in the brine pan and little vegetation in the seashore saline soils. Therefore, the impact on foliage of the project during construction phase is insignificant.

2) Impact on birds

① Impact on Migratory Birds

³ <https://sdgs.un.org/goals/goal7>

⁴ <https://sdgs.un.org/goals/goal8>

According to the construction schedule of the proposed project, the time of the continuous construction was from June, 2007 to September, 2007. Because the migration of birds commonly occurs in Spring and Autumn, the impact of the project on Migratory Birds would mainly arise during September, 2007. The project owner has taken the following measures to minimize the impact based on the life habit research of the local migratory birds which usually migrate in the morning and dusk: The construction was forbidden in the time-section of 05:00-08:00 and 17:00-20:00.

In the light of the Actuality's Assessment of Ecological Environment, the main home range of the migratory birds in the local area are chiefly including the mudflat wetland of the river estuary, the brine pan, the Mariculture Zone and the reed of the reservoir. The construction areas of the project was far away the main home range. Hence, the noise generated from the construction machine and the activities of the workers will have less impact on the migratory birds.

Therefore, the impact of the project on the migratory birds during the construction phase was negligible.

② Impact on the resident birds

In the light of the Actuality's Assessment of Ecological Environment, the main home ranges of the resident birds in the local area are chiefly including the mudflat wetland of the river estuary, the brine pan, the Mariculture Zone, the reed of the reservoir, the agrarian zone, the alkali flat and the village. The project has not occupied the main home ranges and the breeding ranges of the local resident birds.

There are 6 home ranges of birds in the area, of which, 5 are in the west of the project and 1 is in the northeast of the project. According to the Engineering Analysis, the project adopted the manner of spot construction. The floor space under construction of single wind turbine will be only 954m². Thus, the project did not influence the shift of birds among the 6 home ranges.

Therefore, the impact of the project on the resident birds during the construction phase was negligible.

③ Impact of Anthropic Factor on birds

The strict management was adopted to prohibit the workers from all behaviours which will harm the birds.

3) Impact on other animals

No big mammal has been found in the local area. There are only small mammals just like hare and mice. The small animals disturbed by the construction (eg. the snail, the angleworm, the ant) migrated the similar habitat conditions nearby due to their strong ability of migration. So, the species diversity and population size in the area was not obviously influenced by the project during the construction phase.

4) Impact on Salt Industry

The bases of the wind turbine, the branch road and the trolley wire was disposed in the primary evaporation pond. The silt stirred by the construction was deposited quickly and has not entered into the regulating pond and crystallizing pond. So, the impact on salt industry is minimal.

In a word, the ecological impact of the project during construction phase is insignificant.

Operation Phase

1) Impact on the everglade and birds

① Impact on the seashore everglade biogeocenose

There is no waste gas, waste water or solid waste in the process of wind energy. Thus, the proposed project will not obviously affect the seashore everglade biogeocenose.

② Impact on birds

-Impact on Migratory Birds

The Migratory Birds in the local area are mainly large birds, their flying heights are generally 500-600m. The wind turbines are installed in a north-south disposition, the same as the migration direction of the local migratory birds. Furthermore, the max-height of the wind turbine, which is 115.25m, is far lower than the flying height (500-600m) of the migratory birds. Therefore, the wind turbines have no adverse influence on the flying migration.

In the light of the Actuality's Assessment of Ecological Environment, the main home range of the migratory birds in the local area are chiefly including the mudflat wetland of the river estuary, the brine pan, the Mariculture Zone and the reed of the reservoir. And there is almost no activity of birds near the proposed project site. Hence, the noise generated from the operating wind turbines has no bad effect on resting and feeding behavior of birds. The space between wind turbines are 564m and is enough for birds to travel.

The rotor speed of the wind turbines in the project varies between 11.8 and 20 r/m. According to the research of the bird specialists from Holand, the birds can avoid the wind turbine with the rotor speed mentioned above. Therefore, the birds will not be hurt or killed by the wind turbine blade in general. The birds will stop the migration in the horrible weather by the migration habit.

Therefore, the impact of the proposed on the migratory birds during operation phase will be minimal.

-Impact on resident birds

In the light of the Actuality's Assessment of Ecological Environment, the main home ranges of the resident birds in the local area are chiefly including the mudflat wetland of the river estuary, the brine pan, the Mariculture Zone, the reed of the reservoir, the agrarian zone, the alkali flat

and the village. The project did not occupy the main home ranges and the breeding ranges of the local resident birds. There is almost no activity of birds near the proposed project site. So, the noise generated from the operating wind turbines will not have bad effects on resting and breeding behavior of resident birds.

The space between wind turbines is 564m and will be enough for resident birds to travel. For the resident birds, the local area will add the wind turbine with a max-height of 115.25m as the land mark. The relate materials has shown that it was about a week for the birds to be familiar with new things.

So, the project will have a certain extent impact on the activities of resident birds within a week after the completion of the wind turbines. The impact mainly occurs after the completion of the wind turbines and before the operation of the wind farm. When the birds have been familiar with the wind turbines, the project will not have obviously impact on the resident birds.

Therefore, the impact of the proposed on the resident birds during operation phase will be minimal.

-Impact of Anthropic Factor on birds

The strict management is adopted to prohibit the workers from all behaviors which will harm the birds.

In a word, the impact of the proposed project on the everglade of Haixing County and birds during the operation phase will be negligible.

2) Impact on other propagation

The project is located in seashore saline soils and brine pan. There is no vegetation in brine pan and little vegetation in seashore saline soils. The project covers a land area of 185,500 m². This area only takes 0.6% of the whole wind farm area. Most of the area remains unchanged.

No big mammal has been found in the local area. There are only small mammals just like hare and mice. They may migrate back to the former sites after the completion of the project.

Therefore, the project has less impact on other propagation during the operation phase which is negligible.

3) Impact on the Salt Industry

There are about 1.46×10⁸m² brine pan in Haixing County. The area of the brine pan covered by the project only takes 0.1% of the total area of brine pan in Haixing County. And the brine pan covered by the project are all primary evaporation ponds. So, the impact on salt industry is minimal.

4) Visual Impact

The shortest distance between the project and the Yangcheng Reservoir is 600m, so the wind farm will not have bad effect on the scene of Yangcheng Reservoir.

The wind turbines installed in the brine pan will enhance the visual value of the brine pan and demonstrate the harmonious relation between human and nature.

So, the proposed project has little impact on the local scene.

In summary, the ecological impact of the proposed project during operation phase will be insignificant.

2.1.2 Environmental Impact

Construction phase

The max impact range of dust generated by construction activities was about in the downwind 300m. The noise pollution generated by construction machine occurred in the range of 300m. The shortest distance between the project site and the village is 500m. So the dust and the noise generated by construction activities had less impact on local residents.

The main solid waste generated from the site were construction waste as well as the household waste from the personnel at the site. The solid waste had been carried to the landfill.

The waste water was the sewage from the workers. The sewage was sprinkled on the site ground. Because of the spot construction manner, the sewage could not be collected. The little sewage would be absorbed into soil or vaporized and would not form the runoff. So the waste water would not damage the water environment.

Operation Phase

1) Sewage

The waste water from the project during operation phase will only be sewage. The sewage processed by the biological septic tank will in compliance with the second level standards in the Table 4 of <Integrated Wastewater discharge Standard > and will be discharged into the collecting pond. The processed sewage will be utilize to irrigate plant in the project site without discharge because it will in compliance with the standards of dry land in the Standards for irrigation water quality (GB5084-1992).

Therefore, the sewage from the proposed project during the operation phase will have less impact on the environment.

2) Noise

It is predicted that the noise contribution of the wind turbines is 43db (A) with a distance of 400m to the wind turbines. The project is located in the rural area. So the noise will have less impact on the residents if the distance is over 400m. The shortest distance between the project

site and the residents' village is 500m. Hence, the project will have less impact on the residents during the operation phase.

3) Solid waste

The solid waste will be mainly composed of the household garbage generated from the workers in the 110kV booster station. The yield of the solid waste will be about 3.0t/a. The solid waste will be carried termly to the landfill nearby. Therefore, impact of solid waste on the environment is considered to be insignificant.

In summary, by means of measures of pollution avoidance and control as well as ecological recovery, the project will not impact the environment.

Therefore, the project does not bring negative environmental and socio-economic impacts.

2.2 Local Stakeholder Consultation

The project owner invited the comments by local stakeholders through means of advertising on TV Station and on-site surveys.

A questionnaire has been advertised in the Haixing County TV Station on 07/02/2007 and 08/02/2007, which is the most influential media in the local area, to invite the comments from local stakeholders.

The staff of Hebei Construction Investment Zhongxing Wind Energy Co., Ltd carried out on-site surveys on the local government agencies, local villagers and residents, the representative of investor in Haixing County during December in 2006. The survey was conducted through distributing and collecting responses to a questionnaire which was designed by the project owner.

The questionnaires were designed to be easily filled in the following sections:

1) Project introduction

2) Respondent's basic information and education level

3) Questions on:

- What is their opinion on their living environment?
- What is their opinion on existed wind farm projects?
- Will the Project bring improvements to their livelihoods?
- Will the Project have negative impacts on their livelihoods?
- What special issues should be considered to reduce the negative impacts during construction and operation of the project?
- Which are the most important in all negative effects of the project? Which are the least important?

- Will there be interference with TV reception and culture relic?
- Do they agree with the construction of the Project?
- What other comments and suggestions do the respondents have for the company regarding the Project?

4) Space for the respondents' signature and date.

No comments have been received from the viewers.

The on-site survey had 82.6% response rate (38 questionnaires returned out of 46) and the following is a summary of the key findings:

- Education level of the respondents: middle level (6), high level (32).
- The status of the respondents: resident (11), investor (2), project owner (4), government representative (21).
- 100% of respondents agreed with the development of the project.
- 64% of respondents believed that they currently lived in a pleasant life condition and surrounding environment.
- 100% of respondents support the development of the project and believe that the project will have overall positive impacts on their livelihoods.
- About the negative impacts mentioned, 2.6% of respondents concern noise pollution and 5.2% of respondents concern cultivated land.
- 42.1% of respondents suggested accelerating the construction of the project.

The survey shows that the project receives strong support from local people, as further evidenced by the related local government support files. All respondents think that local area has bright future to develop wind farm projects because of the rich wind resource and believe that the project will have overall positive impacts on their livelihoods. They consider that the wind turbine rotation presents the harmonious development of human and nature, and it will not spoil the sight there. The main issues concerned are noise and cultivated land destroyed among the negative impacts. However, the environmental impact assessment shows that the noise levels would be within China national standards and no interference is expected, in the mean time, permanent used land for wind generating sets and buildings of the project are not protected cultivated land. The developer promise that they will enforce all measurements to keep a pleasant environment for local people and if any problem occurs, they will find a best way to solved it.

No negative comments have been received on the project. Moreover, the local community possesses strong positive comments on the effects that the proposed project will make on the

local economy and infrastructure. Therefore there has been no reason to modify the project in the aspect of design, construction and operation due to comments received.

For continuous communication with local stakeholders, the project owner public its office telephone to local people and put a guest's book in the office of the company. Anyone who have comments on the project could write on the book or leave messages by phone. And after these years' operation, no negative comments were received from local people.

2.3 AFOLU-Specific Safeguards

This project is not an AFOLU project. Therefore, this section is not applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project started construction on 01/01/2007. The first wind turbine of the Project started commissioning on 14/04/2008. The Project was put into full operation on 25/04/2008.

It involves the installation of 33 turbines, each of which have a capacity of 1500kW, providing a total installed capacity of 49.5MW. Electricity generated by the Project is supplied to North China Grid via a 110 kV transmission line. The wind generator supplier company is Dongfang Steam Turbine Works, which is a domestic manufacturer. The type of wind generator is determined as FD77A. Key technical specifications of FD77A turbines are listed as Table 1 below.

Table 1. Main technical parameters of key equipment in the Project

Item	Technical parameters	Unit
Type of Turbine	FD77A	
Nominal output	1500	kW
Diameter	77	m
Hub height	61.5	m
Rated voltage	690	V
Nominal wind speed	12.5	m/s

During this monitoring period (14/04/2018-25/11/2021), the monitoring system of the Project was implemented in line with the monitoring plan. The wind farm had a good running, no equipment is overhauled or replaced in this monitoring period. No events or emergency occurred during the monitoring period, which may impact the emission reductions and monitoring.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation in this monitoring period.

3.2.2 Project Description Deviations

There is a crediting period deviation in this monitoring period.

The project was registered under VCS scheme in 2011. The project started operation since 14/04/2008. As per UNFCCC website, it was confirmed that the project activity was registered as CDM project activity on 06/03/2009. Therefore, the VCS crediting period was determined as 14/04/2008 to 05/03/2009. As per VCS scheme under which the project was registered, the project crediting period is allowable for 10 years and could be renewed twice. Therefore, the total VCS crediting period was determined from 14/04/2008 to 25/11/2031, of which the first VCS crediting period is from 14/04/2008 to 13/04/2018 and the second VCS crediting period is from 14/04/2018 to 13/04/2028. The same has been described in the renewed VCS PD.

3.3 Grouped Projects

Not applicable as this is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF_{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Simple operating margin CO ₂ emission factor in year y
Source of data	“2017 Baseline Emission Factors for Regional Power Grids in China” issued by China DNA ⁵
Value applied	0.9680
Justification of choice of data or description of measurement methods and procedures applied	Official public data from NDRC
Purpose of Data	Calculation of baseline emissions

⁵ <http://www.mee.gov.cn/ywgz/ydqhbh/wsqtz/201812/P020181220579925103092.pdf>

Comments	/
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Data / Parameter	EF_{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Simple operating margin CO ₂ emission factor in year y
Source of data	“2017 Baseline Emission Factors for Regional Power Grids in China” issued by China DNA ⁶
Value applied	0.4578
Justification of choice of data or description of measurement methods and procedures applied	Official public data from NDRC
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	WOM
Data unit	%
Description	Weighting of operating margin emissions factor
Source of data	“Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value applied	75
Justification of choice of data or description of measurement methods and procedures applied	Based on the requirements of “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	WBM
Data unit	%

⁶ <http://www.mee.gov.cn/ywgz/ydqhbh/wsqtz/201812/P020181220579925103092.pdf>

Description	Weighting of operating margin emissions factor
Source of data	“Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value applied	25
Justification of choice of data or description of measurement methods and procedures applied	Based on the requirements of “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	/

4.2 Data and Parameters Monitored

The net electricity supplied to the grid by the project will not be measured directly, it is the difference of $EG_{\text{facility},y}$, $EG_{s,y}$, $EG_{c,y}$ and $EG_{\text{backupline},y}$ which have been listed in the following tables.

Data / Parameter	$EG_{\text{facility},y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Measured by electricity meters and it is calculated through Electricity consumed from the grid by the project ($EG_{s,y}$), Electricity consumed from the grid by the project ($EG_{c,y}$) and Electricity consumed by the project through the backup line ($EG_{\text{backupline},y}$). $EG_{\text{facility},y} = EG_{s,y} - EG_{c,y} - EG_{\text{backupline},y}$
Description of measurement methods and procedures to be applied	Both the main meter M1 and backup meter M2 have been installed on the 110kV transmission line as described in the section B4.3. Both are bi-directional meters, which are both managed, operated, maintained and monthly recorded by the project owner. The meter (M3) is installed on the backup line on site as described in the section B4.3. It is a bi-directional meter, which is operated by the grid company but can also be read by the project owner. The project owner records the readings in electronic and manual form. The project owner will receive electricity receipts from the grid company which serve as a cross-check of monthly meter reading records. Data records will be archived for a period of 2 years after the crediting

	period.
Frequency of monitoring/recording	Measured continuously and recorded monthly
Value monitored	443,170.247
Monitoring equipment	-
QA/QC procedures to be applied	The meters will be annually calibrated according to “Technical administrative code of electric energy metering (DL/T448—2016)”. The data from the electricity meters can be cross-checked with electricity receipts.
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{\text{facility},y} = EG_{s,y} - EG_{c,y} - EG_{\text{backupline},y}$
Comments	/

Data / Parameter	EG _{s,y}																															
Data unit	MWh																															
Description	Electricity supplied to the grid by the project																															
Source of data	Measured by main meter (M1) and backup meter (M2)																															
Description of measurement methods and procedures to be applied	Both the main meter and backup meter have been installed on the 110kV transmission line as described in the section B4.3. Both are bi-directional meters, which are both managed, operated, maintained and monthly recorded by the project owner. Data records will be archived for a period of 2 years after the crediting period.																															
Frequency of monitoring/recording	Measured continuously and recorded monthly																															
Value monitored	443,957.927																															
Monitoring equipment	<table><tr><td></td><td>Serial No.</td><td>Type</td><td>Accuracy</td><td>Calibration date</td><td>Validity of the Calibration</td></tr><tr><td rowspan="5">Main meter M1</td><td rowspan="5">93982944</td><td rowspan="5">ZMD402CT</td><td rowspan="5">0.2s</td><td>29/09/2017</td><td>28/09/2018</td></tr><tr><td>29/09/2018</td><td>28/09/2019</td></tr><tr><td>29/09/2019</td><td>28/09/2020</td></tr><tr><td>29/09/2020</td><td>28/09/2021</td></tr><tr><td>29/09/2021</td><td>28/09/2022</td></tr><tr><td>Backup</td><td>93982945</td><td>ZMD402CT</td><td>0.2s</td><td>29/09/2017</td><td>28/09/2018</td></tr></table>							Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Main meter M1	93982944	ZMD402CT	0.2s	29/09/2017	28/09/2018	29/09/2018	28/09/2019	29/09/2019	28/09/2020	29/09/2020	28/09/2021	29/09/2021	28/09/2022	Backup	93982945	ZMD402CT	0.2s	29/09/2017	28/09/2018
	Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration																											
Main meter M1	93982944	ZMD402CT	0.2s	29/09/2017	28/09/2018																											
				29/09/2018	28/09/2019																											
				29/09/2019	28/09/2020																											
				29/09/2020	28/09/2021																											
				29/09/2021	28/09/2022																											
Backup	93982945	ZMD402CT	0.2s	29/09/2017	28/09/2018																											

	meter M2				29/09/2018	28/09/2019
					29/09/2019	28/09/2020
					29/09/2020	28/09/2021
					29/09/2021	28/09/2022
QA/QC procedures to be applied	The meters will be annually calibrated according to “Technical administrative code of electric energy metering (DL/T448—2016)”. The data from the electricity meters can be cross-checked with electricity receipts for the electricity.					
Purpose of the data	Calculation of baseline emissions					
Calculation method	/					
Comments	/					

Data / Parameter	EG _{c,y}					
Data unit	MWh					
Description	Electricity consumed from the grid by the project.					
Source of data	Measured by main meter (M1) and backup meter (M2)					
Description of measurement methods and procedures to be applied	Both the main meter and backup meter have been installed on the 110kV transmission line as described in the section B4.3. Both are bi-directional meters, which are both managed, operated, maintained and monthly recorded by the project owner. Data records will be archived for a period of 2 years after the crediting period.					
Frequency of monitoring/recording	Measured continuously and recorded monthly					
Value monitored	787.680					
Monitoring equipment		Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration
	Main meter M1	93982944	ZMD402CT	0.2s	29/09/2017	28/09/2018
					29/09/2018	28/09/2019
					29/09/2019	28/09/2020
					29/09/2020	28/09/2021
					29/09/2021	28/09/2022
	Backup meter M2	93982945	ZMD402CT	0.2s	29/09/2017	28/09/2018
					29/09/2018	28/09/2019
					29/09/2019	28/09/2020
					29/09/2020	28/09/2021
29/09/2021					28/09/2022	

QA/QC procedures to be applied	The meters will be annually calibrated according to “ Technical administrative code of electric energy metering (DL/T448—2016)”. The data from the electricity meters can be cross-checked with electricity receipts.
Purpose of the data	Calculation of baseline emissions
Calculation method	/
Comments	/

Data / Parameter	$EG_{\text{backupline},y}$																									
Data unit	MWh																									
Description	Electricity consumed by the project through the backup line																									
Source of data	Measured by electricity meter (M3)																									
Description of measurement methods and procedures to be applied	The meter (M3) is installed on the backup line on site as described in the section B4.3. It is a bi-directional meter, which is operated by the grid company but can also be read by the project owner. The project owner records the readings in electronic and manual form. The project owner will receive electricity receipts from the grid company which serve as a cross-check of monthly meter reading records. Data records will be archived for a period of 2 years after the crediting period.																									
Frequency of monitoring/recording	Measured continuously and recorded monthly																									
Value monitored	0																									
Monitoring equipment	<table><tr><td></td><td>Serial No.</td><td>Type</td><td>Accuracy</td><td>Calibration date</td><td>Validity of the Calibration</td></tr><tr><td rowspan="5">Meter M3</td><td rowspan="5">070809002686</td><td rowspan="5">DS862</td><td rowspan="5">0.5s</td><td>29/09/2017</td><td>28/09/2018</td></tr><tr><td>29/09/2018</td><td>28/09/2019</td></tr><tr><td>29/09/2019</td><td>28/09/2020</td></tr><tr><td>29/09/2020</td><td>28/09/2021</td></tr><tr><td>29/09/2021</td><td>28/09/2022</td></tr></table>							Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Meter M3	070809002686	DS862	0.5s	29/09/2017	28/09/2018	29/09/2018	28/09/2019	29/09/2019	28/09/2020	29/09/2020	28/09/2021	29/09/2021	28/09/2022
	Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration																					
Meter M3	070809002686	DS862	0.5s	29/09/2017	28/09/2018																					
				29/09/2018	28/09/2019																					
				29/09/2019	28/09/2020																					
				29/09/2020	28/09/2021																					
				29/09/2021	28/09/2022																					
QA/QC procedures to be applied	The meter will be annually calibrated according to “Technical administrative code of electric energy metering (DL/T448—2016)”. The data from the electricity meter can be cross-checked with the Electricity receipts.																									

Purpose of the data	Calculation of baseline emissions
Calculation method	/
Comments	/

4.3 Monitoring Plan

4.3.1 Data monitored

Quantity of net electricity generation supplied by the project ($EG_{\text{facility},y}$) supplied to the grid by the project is not measured directly. It is calculated by monitoring data of $EG_{s,y}$, $EG_{c,y}$ and $EG_{\text{backupline},y}$ sourced from direct measurement. The aforesaid parameters are defined as bellow:

- 1) $EG_{s,y}$ is the electricity supplied to the Grid by the project
- 2) $EG_{c,y}$ is the electricity consumed from the grid by the project through the main power line.
- 3) $EG_{\text{backupline},y}$ is the electricity delivered to the project through the backup line.

4.3.2 Monitoring organization

This monitoring plan has been implemented by the project owner, Hebei Construction Investment Zhongxing Wind Energy Co., Ltd.

The monitoring activity involves eight employees which include one project manager. The project manager is responsible for the implementation and monitoring of the monitoring activity. There are three departments organized for data report, quality control and training. There are two managers responsible for data report and quality control department by one of each. There are also four staff working in these two departments by two of each. The manager will take charge of the employment administration, as well as the operation implementation and monitoring; and the staff will carry on the concrete assignment based on the guide of their manager. The training department has one manager who is responsible for the entire training process of the project. The monitoring system flowchart of this project is shown in figure 2.

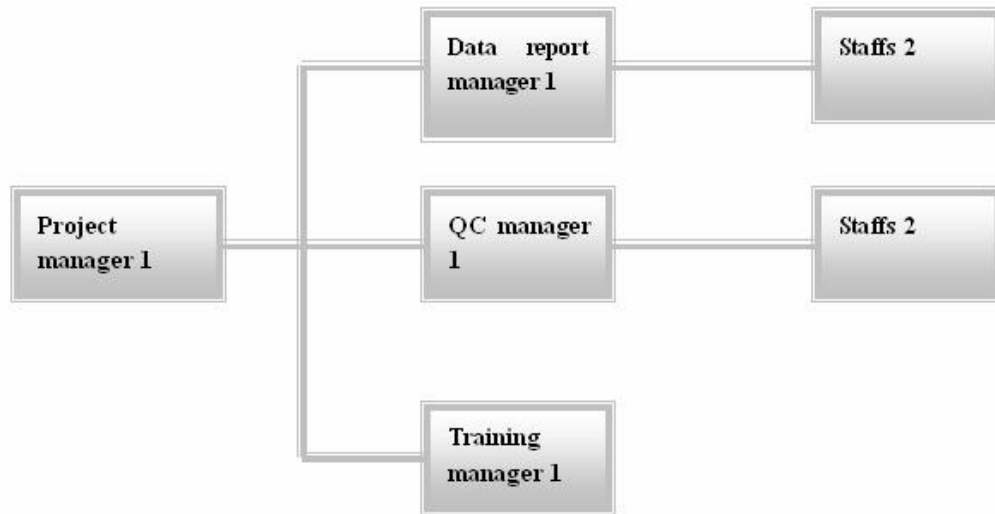


Figure 2. Monitoring system flow chart of the proposed project

4.3.3 Roles and responsibilities

The person with overall responsibility for monitoring activity is Mr Zhao Yongchao. The responsibility for electricity data management reporting and the accuracy of metering equipment in the whole stage is Mr. Zhang Guofeng. Mr. Zhang Kai and Mr. Wu Weiqiang are responsible for recording, management and storing electronic data. The electricity receipt of electricity supplied by the grid will also be kept by them. The responsibility for the calibration and maintenance of the metering equipments is Mr. Zhang Guofeng, Mr. Wang Qingliang and Mr. Li Jie.

4.3.4 Metering System

The electricity generated by the project has been transmitted to an on-site transformer station that increases the voltage to 110 kV, and then be delivered to Gangcheng transformer station which connected to the Hebei Southern Power Grid. The simplified electrical grid connection diagram is shown in the following figure3.

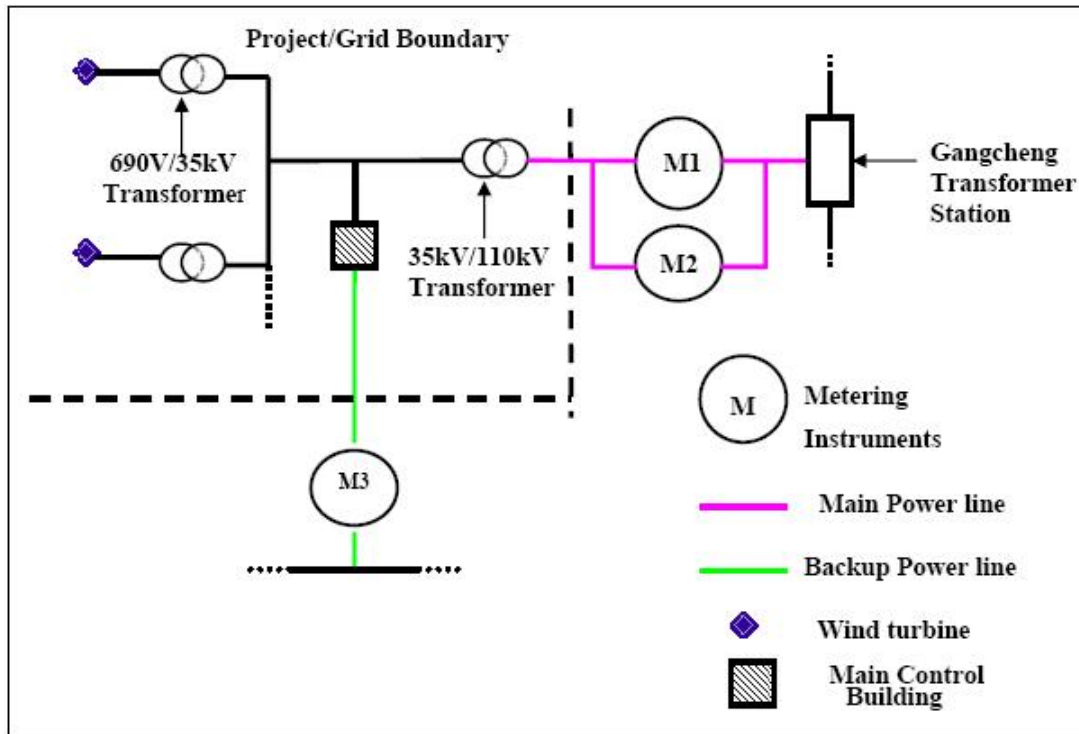


Figure 3. Simplified electrical grid connection diagram

The power line supplying electric power to the grid can also deliver power from the grid to the wind farm in case of emergencies and when the wind farm does not produce enough power for auxiliary power use. The metering equipment runs in two directions and could record two readings, i.e. Electricity supplied to the grid by the project ($EG_{s,y}$) and Electricity consumed from the grid by the project ($EG_{c,y}$).

The metering system indicated by the meter instruments at M1 in Figure 3 is the main meter, the metering system indicated by the meter instruments at M2 in Figure 3 is the backup meter, which are both managed, operated and maintained by the project owner. Both of them can measure the bi-directional electricity flows including exported to and imported from the grid via 110kV line.

The readings at 24:00 of the main meters were read and recorded by the project owner and grid company on the 25th of each month. The invoice, billing receipts and accounting vouchers for receipt of payment for power supplied to the grid serve as a cross-check. The main (M1) and backup (M2) instruments are read by the project owner hourly and records monthly.

$EG_{backupline,y}$ is monitored by M3 in Figure 3 and conducted by grid company and the project owner. The cut-off time is at 24:00 on the 25th of each month. In case blackout in the main power line, the project will consume the electricity through the backup power line. Electricity consumed by the project through the backup line ($EG_{backupline,y}$) is metered by instruments at M3 in figure3 which are operated by the grid company but can also be read by the project owner.

The project owner records the readings in electronic and manual form. The project owner will receive monthly billing receipts from the grid company which serve as a cross-check of the accuracy of the record of the readings of meter M3.

Quantity of net electricity generation supplied by the project is calculated on a monthly basis as:

$$EG_{\text{facility},y} = EG_{s,y} - EG_{c,y} - EG_{\text{backupline},y}$$

With:

$EG_{s,y}$ electricity supplied by the project through the main power line metered by the instruments at M1.

$EG_{c,y}$ electricity consumed by the project through the main power line metered by the instruments at M1.

$EG_{\text{backupline},y}$ electricity delivered to the project through the backup line metered by the instruments at M3.

4.3.5 Emergency procedures

In case the main meter is damaged only the readings the backup meter will be used. In case both the main meter and backup meter are out of order, it shall be inspected, repaired, or replaced immediately by the professional staff and quantity of net electricity generation supplied by the Project to the grid shall be jointly determined by the Project Owner and the power grid company. In case of emergencies, the project entity will not claim emission reductions due to the project activity for the duration of the emergency. In this monitoring period, the wind farm ran smoothly and no emergency happened.

4.3.6 Quality Assurance and Quality Control Procedure

Particular QC staff will be appointed by the Project Owner to take the overall responsibility of calibrating monitoring equipment, managing and processing the monitored data.

The metering equipments will be properly calibrated and checked annually by qualified entity according to national standard (DL/T448-2016) to ensure its accuracy. The metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5% of full-scale rating. The copies of the qualification certificates have been sent to VVB during verification.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to ACM0002 and the registered PDD of the Project, the baseline emission BE_y during the monitoring period results from:

$$BE_y = EG_y \times EF_y$$

$$EG_{facility,y} = EG_{s,y} - EG_{c,y} - EG_{backupline,y}$$

With:

BE_y is the baseline emissions of the project

$EG_{facility,y}$ is Quantity of net electricity generation supplied by the project.

EF_y is the CO₂ emission factor of the grid which is fixed in the first crediting period (tCO₂e/MWh).

$EG_{s,y}$ is the electricity supplied to the grid by the project.

$EG_{c,y}$ is the electricity consumed from the grid by the project.

$EG_{backupline,y}$ is the electricity delivered to the project through the backup line.

On the basis of these weights for the second crediting period, the combined margin emission factor is calculated, and are fixed ex-ante for the duration of the second crediting period as follows:

	CO ₂ emission factor (tCO ₂ /MWh)	Weighting
Simple operating Margin Emissions Factor ($EF_{grid,OM\ simple,y}$)	0.9680	0.75
Build Margin Emissions Factor ($EF_{grid, BM,y}$)	0.4578	0.25
Baseline Emissions Factor ($EF_{grid,CM,y}$)	0.84045	

The yearly electricity volume and baseline emissions are listed in following table 2.

Table 2. Baseline emissions

Period	$EG_{s,y}$ (MWh)	$EG_{c,y}$ (MWh)	$EG_{backupline,y}$ (MWh)	$EG_{facility,y}$ (MWh)	EF_y (tCO ₂ /MWh)	BE_y (tCO ₂ e)
--------	---------------------	---------------------	------------------------------	----------------------------	-----------------------------------	--------------------------------

14/04/2018-25/12/2018 ⁷	73,141.632	184.860	0	72,956.772	0.84045	61,316
26/12/2018-25/12/2019	124,441.120	238.030	0	124,203.090	0.84045	104,386
26/12/2019-25/12/2020	129,644.500	203.170	0	129,441.330	0.84045	108,788
26/12/2020-25/11/2021	116,730.675	161.620	0	116,569.055	0.84045	97,970
Total in this monitoring period	443,957.927	787.680	0	443,170.247		372,460

The monthly data are shown in appendix 1.

5.2 Project Emissions

According to ACM0002, the emission of wind power project activity is zero, i.e. $PE_y=0$.

5.3 Leakage

According to ACM0002, there is no leakage of the project.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
14/04/2018-25/12/2018	61,316	0	0	61,316
26/12/2018-25/12/2019	104,386	0	0	104,386
26/12/2019-25/12/2020	108,788	0	0	108,788
26/12/2020-25/11/2021	97,970	0	0	97,970
Total	372,460	0	0	372,460

⁷ The $EG_{s,y}$ and $EG_{c,y}$ is 13317.227MWh and 22.030MWh during 01/04/2018 to 25/04/2018 based on Monthly Meter Reading records and Electricity receipts.

According to the issued MR (monitoring period from 01/01/2013 to 13/04/2018), the $EG_{s,y}$ and $EG_{c,y}$ of 8071.404MWh and 11.220MWh have been confirmed and calculated during 01/04/2018 to 13/04/2018.

Thus, the $EG_{s,y}$ during 14/04/2018 to 25/04/2018 is calculated as $13317.227\text{MWh}-8071.404\text{MWh}=5245.823$, and the $EG_{c,y}$ during 14/04/2018 to 25/04/2018 is calculated as $22.030\text{MWh}-11.220\text{MWh}=10.810\text{MWh}$. These data have been confirmed by the grid company.

The estimated annual emission reductions are 96,650 tCO₂e as per renewed VCS PD. The monitoring period covers 1322 days. The estimated emission reductions during this monitoring period are $96,650/365 \times 1322 = 350,058$ tCO₂e. The actual emission reductions in this period are 372,460 tCO₂e, which are 6.40% more than the estimated value within the normal variation range.

The increase in electricity does not adversely impact the project additionality, as per the registered PDD only if the electricity increases by 9.5% in each year during the lifetime can the project reach the benchmark. The increase is mainly due to the fluctuation of the wind resources and deemed reasonable.

APPENDIX I: < MONTHLY AND YEARLY ELECTRICTY >

Year	Period	EG _{s,y} (MWh)			EG _{c,y} (MWh)			EG _{backuptline,y} (MWh)	EG _{facility,y} (MWh)
		Data from monthly meter reading records (MRRs) (MWh)	Data on electricity receipts (MWh)	Data for ER calculation (MWh)	Data from monthly meter reading records (MRRs) (MWh)	Data on electricity receipts (MWh)	Data for ER calculation (MWh)	Data for ER calculation (MWh)	
		A	B	C=Min(A,B)	D	E	F=Max(D,E)	G	
2018	14/04/2018-25/04/2018	5,245.823	5,245.823	5,245.823	10.810	10.810	10.810	0.000	5,235.013
	26/04/2018-25/05/2018	9,239.226	9,239.226	9,239.226	18.040	18.040	18.040	0.000	9,221.186
	26/05/2018-25/06/2018	7,017.092	7,017.092	7,017.092	28.360	28.360	28.360	0.000	6,988.732
	26/06/2018-25/07/2018	6,219.015	6,219.015	6,219.015	21.340	21.340	21.340	0.000	6,197.675
	26/07/2018-25/08/2018	6,223.736	6,223.736	6,223.736	22.080	22.080	22.080	0.000	6,201.656
	26/08/2018-25/09/2018	6,702.117	6,702.117	6,702.117	17.280	17.280	17.280	0.000	6,684.837
	26/09/2018-25/10/2018	8,630.218	8,630.218	8,630.218	19.030	19.030	19.030	0.000	8,611.188
	26/10/2018-25/11/2018	10,960.623	10,960.623	10,960.623	24.870	24.870	24.870	0.000	10,935.753
	26/11/2018-25/12/2018	12,903.782	12,903.782	12,903.782	23.050	23.050	23.050	0.000	12,880.732
	Subtotal	/	/	73,141.632	/	/	184.860	0.000	72,956.772
2019	26/12/2018-25/01/2019	12,803.083	12,803.083	12,803.083	31.090	31.090	31.090	0.000	12,771.993
	26/01/2019-25/02/2019	11,903.665	11,903.665	11,903.665	23.570	23.570	23.570	0.000	11,880.095
	26/02/2019-25/03/2019	12,923.815	12,923.815	12,923.815	14.650	14.650	14.650	0.000	12,909.165
	26/03/2019-25/04/2019	12,275.034	12,275.034	12,275.034	14.790	14.790	14.790	0.000	12,260.244
	26/04/2019-25/05/2019	13,092.183	13,092.183	13,092.183	10.220	10.220	10.220	0.000	13,081.963
	26/05/2019-25/06/2019	8,890.763	8,890.763	8,890.763	16.240	16.240	16.240	0.000	8,874.523
	26/06/2019-25/07/2019	7,012.705	7,012.705	7,012.705	19.810	19.810	19.810	0.000	6,992.895
	26/07/2019-25/08/2019	6,530.989	6,530.989	6,530.989	25.180	25.180	25.180	0.000	6,505.809
	26/08/2019-25/09/2019	6,620.417	6,620.417	6,620.417	23.910	23.910	23.910	0.000	6,596.507
	26/09/2019-25/10/2019	9,248.016	9,248.016	9,248.016	10.760	10.760	10.760	0.000	9,237.256
	26/10/2019-25/11/2019	10,237.103	10,237.103	10,237.103	26.430	26.430	26.430	0.000	10,210.673
	26/11/2019-25/12/2019	12,903.347	12,903.347	12,903.347	21.380	21.380	21.380	0.000	12,881.967

	Subtotal	/	/	124,441.120	/	/	238.030	0.000	124,203.090
2020	26/12/2019-25/01/2020	11,932.803	11,932.803	11,932.803	15.190	15.190	15.190	0.000	11,917.613
	26/01/2020-25/02/2020	12,976.346	12,976.346	12,976.346	20.940	20.940	20.940	0.000	12,955.406
	26/02/2020-25/03/2020	13,904.974	13,904.974	13,904.974	9.870	9.870	9.870	0.000	13,895.104
	26/03/2020-25/04/2020	14,880.447	14,880.447	14,880.447	10.660	10.660	10.660	0.000	14,869.787
	26/04/2020-25/05/2020	10,936.793	10,936.793	10,936.793	15.230	15.230	15.230	0.000	10,921.563
	26/05/2020-25/06/2020	10,482.773	10,482.773	10,482.773	24.180	24.180	24.180	0.000	10,458.593
	26/06/2020-25/07/2020	8,093.014	8,093.014	8,093.014	20.880	20.880	20.880	0.000	8,072.134
	26/07/2020-25/08/2020	7,884.823	7,884.823	7,884.823	21.640	21.640	21.640	0.000	7,863.183
	26/08/2020-25/09/2020	7,023.485	7,023.485	7,023.485	10.630	10.630	10.630	0.000	7,012.855
	26/09/2020-25/10/2020	8,801.347	8,801.347	8,801.347	19.050	19.050	19.050	0.000	8,782.297
	26/10/2020-25/11/2020	12,406.013	12,406.013	12,406.013	6.680	6.680	6.680	0.000	12,399.333
	26/11/2020-25/12/2020	10,321.682	10,321.682	10,321.682	28.220	28.220	28.220	0.000	10,293.462
	Subtotal	/	/	129,644.500	/	/	203.170	0.000	129,441.330
2021	26/12/2020-25/01/2021	9,231.934	9,231.934	9,231.934	17.920	17.920	17.920	0.000	9,214.014
	26/01/2021-25/02/2021	12,823.014	12,823.014	12,823.014	6.880	6.880	6.880	0.000	12,816.134
	26/02/2021-25/03/2021	11,382.024	11,382.024	11,382.024	9.250	9.250	9.250	0.000	11,372.774
	26/03/2021-25/04/2021	13,808.472	13,808.472	13,808.472	18.620	18.620	18.620	0.000	13,789.852
	26/04/2021-25/05/2021	12,923.183	12,923.183	12,923.183	13.050	13.050	13.050	0.000	12,910.133
	26/05/2021-25/06/2021	7,980.237	7,980.237	7,980.237	10.770	10.770	10.770	0.000	7,969.467
	26/06/2021-25/07/2021	7,093.672	7,093.672	7,093.672	6.390	6.390	6.390	0.000	7,087.282
	26/07/2021-25/08/2021	6,980.923	6,980.923	6,980.923	24.520	24.520	24.520	0.000	6,956.403
	26/08/2021-25/09/2021	9,750.834	9,750.834	9,750.834	26.010	26.010	26.010	0.000	9,724.824
	26/09/2021-25/10/2021	11,420.368	11,420.368	11,420.368	17.290	17.290	17.290	0.000	11,403.078
	26/10/2021-25/11/2021	13,336.014	13,336.014	13,336.014	10.920	10.920	10.920	0.000	13,325.094
	Subtotal	/	/	116,730.675	/	/	161.620	0.000	116,569.055
Total		/		443,957.927	/		787.680	0.000	443,170.247