



**Verified Carbon
Standard**

HEBEI HAIXING 49.5MW WIND FARM PROJECT

Document Prepared by Demeter Venture UK Limited

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CONTENTS

1	PROJECT DETAILS.....	4
1.1	Summary Description of the Implementation Status of the Project	4
1.2	Sectoral Scope and Project Type	4
1.3	Project Proponent	4
1.4	Other Entities Involved in the Project	4
1.5	Project Start Date	5
1.6	Project Crediting Period	5
1.7	Project Location	5
1.8	Title and Reference of Methodology	6
1.9	Participation under other GHG Programs.....	6
1.10	Other Forms of Credit.....	6
1.11	Sustainable Development.....	7
2	SAFEGUARDS.....	7
2.1	No Net Harm	7
2.2	Local Stakeholder Consultation	12
2.3	AFOLU-Specific Safeguards	14
3	IMPLEMENTATION STATUS	14
3.1	Implementation Status of the Project Activity	14
3.2	Deviations.....	15
3.3	Grouped Projects	15
4	DATA AND PARAMETERS.....	15
4.1	Data and Parameters Available at Validation	15
4.2	Data and Parameters Monitored.....	16
4.3	Monitoring Plan.....	19
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	23
5.1	Baseline Emissions	23
5.2	Project Emissions	24
5.3	Leakage.....	24
5.4	Net GHG Emission Reductions and Removals.....	24

APPENDIX I: <MONTHLY BASELINE EMISSIONS>	25
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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.

This monitoring period is from 01/01/2013-13/04/2018.

The total GHG emission reductions generated in this monitoring period are 666,905 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

Organization name	Hebei Construction Investment Zhongxing Wind Energy Co., Ltd
Contact person	Yangxiaohua
Title	Manager
Address	No.9 Yuhua Western Road, Shijiazhuang City, Hebei Province, P.R.China
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1.4 Other Entities Involved in the Project

Organization name	Demeter Venture UK Limited
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Role in the Project	Project participant
Contact person	Susan Lu
Title	Manager
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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 under VCS is from 14/04/2008 to 13/04/2018 (10years, renewable). Therefore, the total crediting period under VCS would have been from 14/04/2008 to 13/04/2038 (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 (21years).

According to VCS standard, the total crediting period under VCS is from 14/04/2008 to 05/03/2030.

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 consolidated baseline and monitoring methodology ACM0002 - Consolidated methodology for grid-connected electricity generation from renewable sources (version 06).

Tool for the demonstration and assessment of additionality (version 05).

Tool to calculate the emission factor for an electricity system (Version 02).

Reference: <http://cdm.unfccc.int/methodologies/PAmethodologies/approved>

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 clearly fits into the development priority of the People's Republic of China, and supports China in stimulating and accelerating the commercialization of grid-connected renewable energy technologies and the green-power market developments. It therefore helps reducing GHG emissions resulting from the high-growth, coal-dominated business-as-usual scenario. The Project promotes sustainable development through the following aspects:

- Reduce greenhouse gas emissions in China compared to a business-as-usual scenario
- Help to stimulate the growth of the wind power industry in China
- Create local employment during the assembly and installation of wind turbines, and for operation of the wind farm
- Reduce other pollutants resulting from the power generation industry in China, compared to a business-as-usual approach.

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

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 Anthropogenic 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 01/11/2008.

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 (01/01/2013-13/04/2018), 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 are no project description deviations in this monitoring period.

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 _y
Data unit	tCO ₂ e/MWh
Description	Baseline emission factor: the combined emission factor of the project grid system in year y. EF _y was not directly available at validation but calculated based on other parameters in the PDD available at validation, therefore in the MR, only EF _y is included and the rest of the parameters are either used to calculate EF _{CM} or not used in the MR.
Source of data	Registered PDD
Value applied	1.0205
Justification of choice of data or description of measurement methods and procedures applied	China DNA: Baseline Emission Factor of China Region Grid, http://www.mee.gov.cn/ywgz/ycqhbh/wsqtkz/201812/W020181220585203933181.pdf And the registered PDD.
Purpose of Data	Calculation of baseline emissions
Comments	The emission factor of the Project was ex-ante determined and is fixed during the first crediting period. All data and parameters had been determined at registration.

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 $EG_{s,y}$, $EG_{c,y}$ and $EG_{backuptime,y}$ which have been listed in the following tables.

Data / Parameter	EG _{s,y}						
Data unit	MWh						
Description	Electricity supplied to the grid by the project.						
Source of data	Directly measured by meter						
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	655,603.476						
Monitoring equipment	Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency	
	Main meter M1 93982944	ZMD402CT	0.2s	11/11/2012	10/11/2013	Annually	
				01/11/2013	31/10/2014		
				24/10/2014	23/10/2015		
				16/10/2015	15/10/2016		
				10/10/2016	09/10/2017		
				29/09/2017	28/09/2018		
	Backup meter M2 93982945	ZMD402CT	0.2s	11/11/2012	10/11/2013	Annually	
				01/11/2013	31/10/2014		
				24/10/2014	23/10/2015		
				16/10/2015	15/10/2016		
				10/10/2016	09/10/2017		
				29/09/2017	28/09/2018		
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 the Electricity Transaction Notes or sales 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	Directly measured by meter																																											
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	2,066.328																																											
Monitoring equipment	<table><tr><th>Serial No.</th><th>Type</th><th>Accuracy</th><th>Calibration date</th><th>Validity of the Calibration</th><th>Calibration frequency</th></tr><tr><td rowspan="6">Main meter M1 93982944</td><td rowspan="6">ZMD402CT</td><td rowspan="6">0.2s</td><td>11/11/2012</td><td>10/11/2013</td><td rowspan="6">Annually</td></tr><tr><td>01/11/2013</td><td>31/10/2014</td></tr><tr><td>24/10/2014</td><td>23/10/2015</td></tr><tr><td>16/10/2015</td><td>15/10/2016</td></tr><tr><td>10/10/2016</td><td>09/10/2017</td></tr><tr><td>29/09/2017</td><td>28/09/2018</td></tr><tr><td rowspan="6">Backup meter M2 93982945</td><td rowspan="6">ZMD402CT</td><td rowspan="6">0.2s</td><td>11/11/2012</td><td>10/11/2013</td><td rowspan="6">Annually</td></tr><tr><td>01/11/2013</td><td>31/10/2014</td></tr><tr><td>24/10/2014</td><td>23/10/2015</td></tr><tr><td>16/10/2015</td><td>15/10/2016</td></tr><tr><td>10/10/2016</td><td>09/10/2017</td></tr><tr><td>29/09/2017</td><td>28/09/2018</td></tr></table>						Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency	Main meter M1 93982944	ZMD402CT	0.2s	11/11/2012	10/11/2013	Annually	01/11/2013	31/10/2014	24/10/2014	23/10/2015	16/10/2015	15/10/2016	10/10/2016	09/10/2017	29/09/2017	28/09/2018	Backup meter M2 93982945	ZMD402CT	0.2s	11/11/2012	10/11/2013	Annually	01/11/2013	31/10/2014	24/10/2014	23/10/2015	16/10/2015	15/10/2016	10/10/2016	09/10/2017	29/09/2017	28/09/2018
Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency																																							
Main meter M1 93982944	ZMD402CT	0.2s	11/11/2012	10/11/2013	Annually																																							
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			10/10/2016	09/10/2017																																								
			29/09/2017	28/09/2018																																								
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 the Electricity Transaction Notes.																																											

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

Data / Parameter	EG _{backupline,y}																											
Data unit	MWh																											
Description	Electricity delivered to the project through the backup line.																											
Source of data	Directly measured by meter																											
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 monthly Electricity Transaction Notes from the grid company which serve as a cross-check of the accuracy of the record of M3. 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><th>Serial No.</th><th>Type</th><th>Accuracy</th><th>Calibration date</th><th>Validity of the Calibration</th><th>Calibration frequency</th></tr><tr><td rowspan="6">M3 07080900 2686</td><td rowspan="6">DS862</td><td rowspan="6">0.5s</td><td>11/11/2012</td><td>10/11/2013</td><td rowspan="6">Annually</td></tr><tr><td>01/11/2013</td><td>31/10/2014</td></tr><tr><td>24/10/2014</td><td>23/10/2015</td></tr><tr><td>16/10/2015</td><td>15/10/2016</td></tr><tr><td>10/10/2016</td><td>09/10/2017</td></tr><tr><td>29/09/2017</td><td>28/09/2018</td></tr></table>						Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency	M3 07080900 2686	DS862	0.5s	11/11/2012	10/11/2013	Annually	01/11/2013	31/10/2014	24/10/2014	23/10/2015	16/10/2015	15/10/2016	10/10/2016	09/10/2017	29/09/2017	28/09/2018
Serial No.	Type	Accuracy	Calibration date	Validity of the Calibration	Calibration frequency																							
M3 07080900 2686	DS862	0.5s	11/11/2012	10/11/2013	Annually																							
			01/11/2013	31/10/2014																								
			24/10/2014	23/10/2015																								
			16/10/2015	15/10/2016																								
			10/10/2016	09/10/2017																								
			29/09/2017	28/09/2018																								
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 Transaction Notes.																											

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

4.3 Monitoring Plan

4.3.1 Data monitored

The net electricity (EG_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 $EG_{backupline,y}$ 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) $EG_{backupline,y}$ 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.

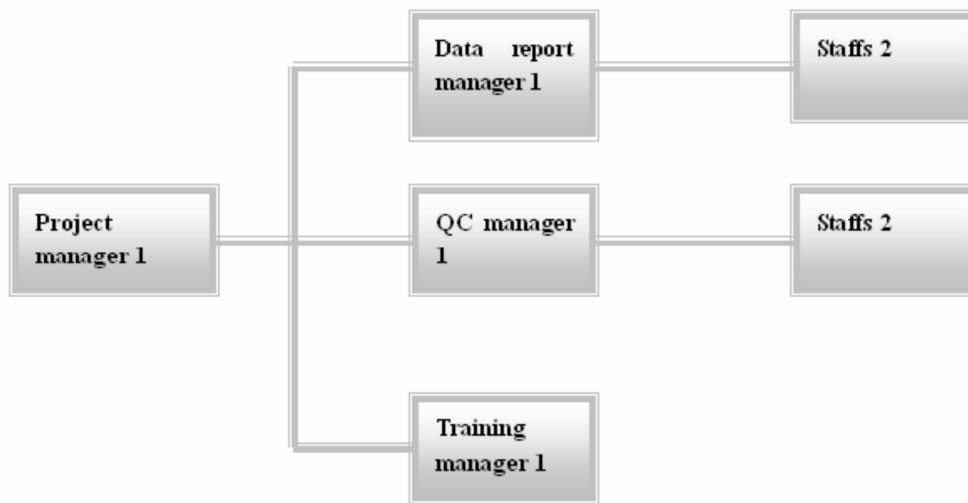


Figure 2. Monitoring system flow chart of the proposed project

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 sales 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.

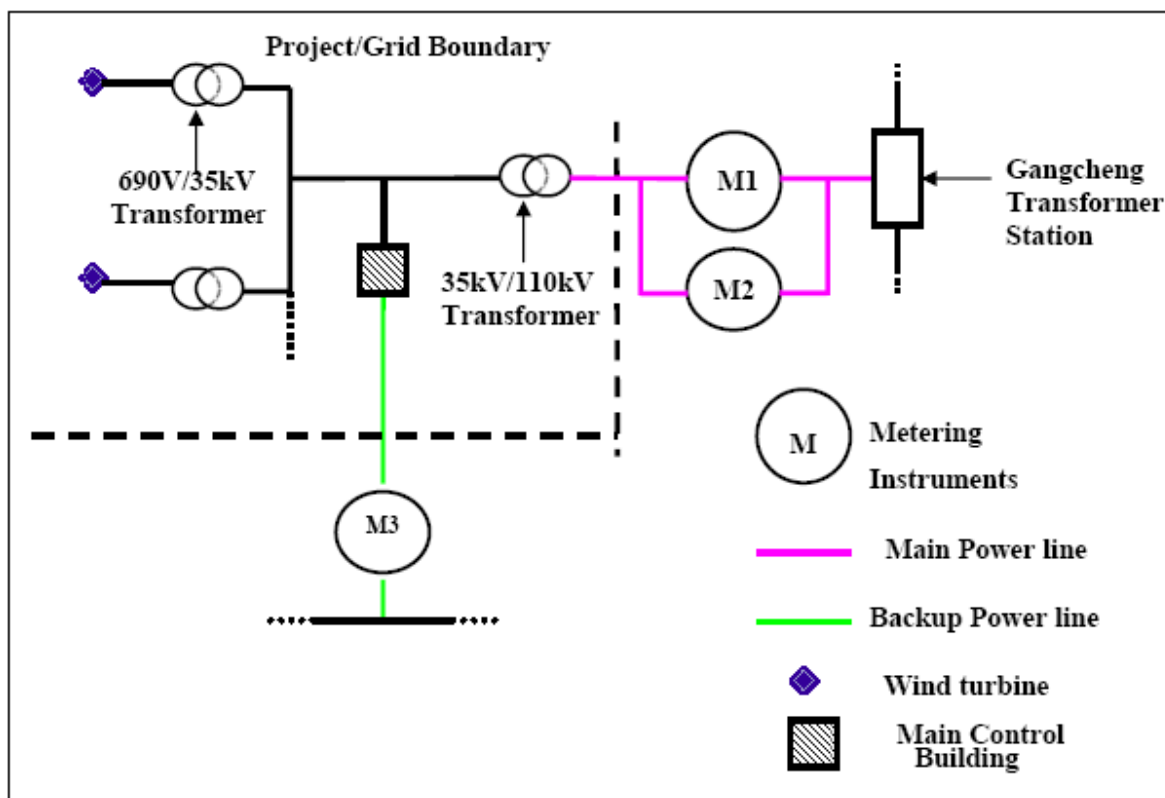


Figure 3. Simplified electrical grid connection diagram

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 ($EG_{s,y}$) and electricity consumed from the grid ($EG_{c,y}$).

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 Figure3 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. Power delivered to the project through the backup power 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.

Net electricity supplied to the grid by the project is calculated on a monthly basis as:

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

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.

$EG_{backupline,y}$ 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.

Hebei Electric Power Research Institute is accredited entity authorized by Quality and Technology Supervision Bureau of Hebei Province. The copies of the qualification certificate have been sent to DOE.

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:

$$BE_y = EG_y \times EF_y$$

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

With:

BE_y is the baseline emissions of the project.

EG_y is the net electricity supplied to the grid 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.

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

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)	$EG_{\text{backupline},y}$ (MWh)	EG_y (MWh)	EF_y (tCO ₂ /MWh)	BE_y (tCO ₂ e)
01/01/2013- 25/12/2013	108,379.392	397.980	0	107,981.412	1.0205	110,189
26/12/2013- 25/12/2014	125,800.620	367.620	0	125,433.000	1.0205	127,999
26/12/2014- 25/12/2015	125,395.644	392.832	0	125,002.812	1.0205	127,560
26/12/2015- 25/12/2016	124,548.072	372.108	0	124,175.964	1.0205	126,715
26/12/2016- 25/12/2017	124,539.756	408.540	0	124,131.216	1.0205	126,671
26/12/2017- 13/04/2018	46,939.992	127.248	0	46,812.744	1.0205	47,771

Total in this monitoring period	655,603.476	2,066.328	0	653,537.148	1.0205	666,905
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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)
01/01/2013-25/12/2013	110,189	0	0	110,189
26/12/2013-25/12/2014	127,999	0	0	127,999
26/12/2014-25/12/2015	127,560	0	0	127,560
26/12/2015-25/12/2016	126,715	0	0	126,715
26/12/2016-25/12/2017	126,671	0	0	126,671
26/12/2017-13/04/2018	47,771	0	0	47,771
Total	666,905	0	0	666,905

The estimated annual emission reductions are 117,356 tCO₂e as per registered PDD. The monitoring period covers 1929 days. The estimated emission reductions during this monitoring period are $117,356/365 \times 1929 = 620,218$ tCO₂e. The actual emission reductions in this period are 666,905 tCO₂e, which are 7.53% more than the estimated value within the normal variation range and this will not impact the additionality as it does not reach the IRR benchmark.

APPENDIX I: <MONTHLY BASELINE EMISSIONS>

Year	Month	Electricity supplied to Grid (EG _{s,y}) (MWh)			Electricity imported via main line (EG _{c,y}) (MWh)			Electricity imported via backupline (EG _{backupline,y}) (MWh)			Net Electricity supplied to Grid (EG _y) (MWh)	EF (tCO ₂ e/MWh)	Baseline Emissions (BE _y) (tCO ₂ e)
		Data from meter readings (MWh)	Data on sale receipts (MWh)	Data for ER calculation (MWh)	Data from meter readings (MWh)	Data on purchase invoices (MWh)	Data for ER calculation (MWh)	Data from meter readings (MWh)	Data on purchase invoices (MWh)	Data for ER calculation (MWh)			
		A	B	C=Min(A,B)	D	E	F=Max(D,E)	G	H	I=Max(G,H)	J=C-F-I	K	L=J*K
2013	01/01/2013-25/01/2013	8,838.984	8,838.984	8,838.984	55.572	55.572	55.572	0.000	0.000	0.000	8,783.412	1.0205	8,963
	26/01/2013-25/02/2013	11,556.072	11,556.072	11,556.072	30.756	30.756	30.756	0.000	0.000	0.000	11,525.316	1.0205	11,761
	26/02/2013-25/03/2013	14,677.476	14,677.476	14,677.476	12.672	12.672	12.672	0.000	0.000	0.000	14,664.804	1.0205	14,965
	26/03/2013-25/04/2013	15,990.480	15,990.480	15,990.480	12.540	12.540	12.540	0.000	0.000	0.000	15,977.940	1.0205	16,305
	26/04/2013-25/05/2013	8,759.256	8,759.256	8,759.256	22.836	22.836	22.836	0.000	0.000	0.000	8,736.420	1.0205	8,915
	26/05/2013-25/06/2013	6,430.116	6,430.116	6,430.116	29.832	29.832	29.832	0.000	0.000	0.000	6,400.284	1.0205	6,531
	26/06/2013-25/07/2013	5,385.864	5,385.864	5,385.864	55.572	55.572	55.572	0.000	0.000	0.000	5,330.292	1.0205	5,439
	26/07/2013-25/08/2013	5,113.284	5,113.284	5,113.284	49.236	49.236	49.236	0.000	0.000	0.000	5,064.048	1.0205	5,167
	26/08/2013-25/09/2013	5,463.216	5,463.216	5,463.216	31.020	31.020	31.020	0.000	0.000	0.000	5,432.196	1.0205	5,543
	26/09/2013-25/10/2013	6,885.912	6,885.912	6,885.912	25.872	25.872	25.872	0.000	0.000	0.000	6,860.040	1.0205	7,000
	26/10/2013-25/11/2013	9,239.472	9,239.472	9,239.472	30.096	30.096	30.096	0.000	0.000	0.000	9,209.376	1.0205	9,398

	26/11/2013-25/12/2013	10,039.260	10,039.260	10,039.260	41.976	41.976	41.976	0.000	0.000	0.000	9,997.284	1.0205	10,202
	Subtotal			108,379.392			397.980			0.000	107,981.412		110,189
2014	26/12/2013-25/01/2014	11,560.428	11,560.428	11,560.428	34.980	34.980	34.980	0.000	0.000	0.000	11,525.448	1.0205	11,761
	26/01/2014-25/02/2014	14,536.368	14,536.368	14,536.368	33.924	33.924	33.924	0.000	0.000	0.000	14,502.444	1.0205	14,799
	26/02/2014-25/03/2014	17,790.300	17,790.300	17,790.300	19.536	19.536	19.536	0.000	0.000	0.000	17,770.764	1.0205	18,135
	26/03/2014-25/04/2014	18,025.524	18,025.524	18,025.524	24.816	24.816	24.816	0.000	0.000	0.000	18,000.708	1.0205	18,369
	26/04/2014-25/05/2014	11,665.632	11,665.632	11,665.632	8.448	8.448	8.448	0.000	0.000	0.000	11,657.184	1.0205	11,896
	26/05/2014-25/06/2014	7,920.000	7,920.000	7,920.000	31.020	31.020	31.020	0.000	0.000	0.000	7,888.980	1.0205	8,050
	26/06/2014-25/07/2014	6,903.864	6,903.864	6,903.864	29.304	29.304	29.304	0.000	0.000	0.000	6,874.560	1.0205	7,015
	26/07/2014-25/08/2014	5,166.876	5,166.876	5,166.876	52.404	52.404	52.404	0.000	0.000	0.000	5,114.472	1.0205	5,219
	26/08/2014-25/09/2014	5,841.396	5,841.396	5,841.396	47.256	47.256	47.256	0.000	0.000	0.000	5,794.140	1.0205	5,912
	26/09/2014-25/10/2014	7,748.796	7,748.796	7,748.796	33.924	33.924	33.924	0.000	0.000	0.000	7,714.872	1.0205	7,873
	26/10/2014-25/11/2014	9,327.912	9,327.912	9,327.912	31.284	31.284	31.284	0.000	0.000	0.000	9,296.628	1.0205	9,487
	26/11/2014-25/12/2014	9,313.524	9,313.524	9,313.524	20.724	20.724	20.724	0.000	0.000	0.000	9,292.800	1.0205	9,483
	Subtotal			125,800.620			367.620			0.000	125,433.000		127,999
2015	26/12/2014-25/01/2015	10,508.916	10,508.916	10,508.916	33.792	33.792	33.792	0.000	0.000	0.000	10,475.124	1.0205	10,689
	26/01/2015-25/02/2015	11,533.896	11,533.896	11,533.896	24.684	24.684	24.684	0.000	0.000	0.000	11,509.212	1.0205	11,745
	26/02/2015-25/03/2015	15,494.820	15,494.820	15,494.820	14.124	14.124	14.124	0.000	0.000	0.000	15,480.696	1.0205	15,798
	26/03/2015-25/04/2015	16,797.924	16,797.924	16,797.924	18.480	18.480	18.480	0.000	0.000	0.000	16,779.444	1.0205	17,123
	26/04/2015-25/05/2015	11,414.832	11,414.832	11,414.832	14.520	14.520	14.520	0.000	0.000	0.000	11,400.312	1.0205	11,634
	26/05/2015-25/06/2015	10,400.280	10,400.280	10,400.280	32.340	32.340	32.340	0.000	0.000	0.000	10,367.940	1.0205	10,580

	26/06/2015-25/07/2015	7,603.596	7,603.596	7,603.596	39.864	39.864	39.864	0.000	0.000	0.000	7,563.732	1.0205	7,718
	26/07/2015-25/08/2015	7,115.064	7,115.064	7,115.064	46.596	46.596	46.596	0.000	0.000	0.000	7,068.468	1.0205	7,213
	26/08/2015-25/09/2015	6,801.828	6,801.828	6,801.828	35.640	35.640	35.640	0.000	0.000	0.000	6,766.188	1.0205	6,904
	26/09/2015-25/10/2015	8,520.600	8,520.600	8,520.600	40.260	40.260	40.260	0.000	0.000	0.000	8,480.340	1.0205	8,654
	26/10/2015-25/11/2015	9,237.360	9,237.360	9,237.360	43.296	43.296	43.296	0.000	0.000	0.000	9,194.064	1.0205	9,382
	26/11/2015-25/12/2015	9,966.528	9,966.528	9,966.528	49.236	49.236	49.236	0.000	0.000	0.000	9,917.292	1.0205	10,120
	Subtotal			125,395.644			392.832			0.000	125,002.812		127,560
2016	26/12/2015-25/01/2016	9,880.596	9,880.596	9,880.596	27.852	27.852	27.852	0.000	0.000	0.000	9,852.744	1.0205	10,054
	26/01/2016-25/02/2016	9,666.360	9,666.360	9,666.360	25.344	25.344	25.344	0.000	0.000	0.000	9,641.016	1.0205	9,838
	26/02/2016-25/03/2016	15,131.160	15,131.160	15,131.160	19.140	19.140	19.140	0.000	0.000	0.000	15,112.020	1.0205	15,421
	26/03/2016-25/04/2016	17,375.424	17,375.424	17,375.424	19.932	19.932	19.932	0.000	0.000	0.000	17,355.492	1.0205	17,711
	26/04/2016-25/05/2016	11,698.368	11,698.368	11,698.368	17.688	17.688	17.688	0.000	0.000	0.000	11,680.680	1.0205	11,920
	26/05/2016-25/06/2016	8,685.468	8,685.468	8,685.468	29.436	29.436	29.436	0.000	0.000	0.000	8,656.032	1.0205	8,833
	26/06/2016-25/07/2016	6,702.432	6,702.432	6,702.432	44.484	44.484	44.484	0.000	0.000	0.000	6,657.948	1.0205	6,794
	26/07/2016-25/08/2016	6,291.516	6,291.516	6,291.516	44.088	44.088	44.088	0.000	0.000	0.000	6,247.428	1.0205	6,375
	26/08/2016-25/09/2016	7,025.040	7,025.040	7,025.040	42.768	42.768	42.768	0.000	0.000	0.000	6,982.272	1.0205	7,125
	26/09/2016-25/10/2016	9,035.400	9,035.400	9,035.400	20.460	20.460	20.460	0.000	0.000	0.000	9,014.940	1.0205	9,199
	26/10/2016-25/11/2016	11,393.580	11,393.580	11,393.580	27.984	27.984	27.984	0.000	0.000	0.000	11,365.596	1.0205	11,598
	26/11/2016-25/12/2016	11,662.728	11,662.728	11,662.728	52.932	52.932	52.932	0.000	0.000	0.000	11,609.796	1.0205	11,847
	Subtotal			124,548.072			372.108			0.000	124,175.964		126,715
2017	26/12/2016-25/01/2017	11,723.052	11,723.052	11,723.052	38.676	38.676	38.676	0.000	0.000	0.000	11,684.376	1.0205	11,923

	26/01/2017-25/02/2017	10,336.524	10,336.524	10,336.524	31.416	31.416	31.416	0.000	0.000	0.000	10,305.108	1.0205	10,516
	26/02/2017-25/03/2017	15,708.132	15,708.132	15,708.132	26.928	26.928	26.928	0.000	0.000	0.000	15,681.204	1.0205	16,002
	26/03/2017-25/04/2017	16,380.144	16,380.144	16,380.144	16.368	16.368	16.368	0.000	0.000	0.000	16,363.776	1.0205	16,699
	26/04/2017-25/05/2017	11,621.016	11,621.016	11,621.016	17.424	17.424	17.424	0.000	0.000	0.000	11,603.592	1.0205	11,841
	26/05/2017-25/06/2017	8,940.624	8,940.624	8,940.624	22.308	22.308	22.308	0.000	0.000	0.000	8,918.316	1.0205	9,101
	26/06/2017-25/07/2017	7,018.044	7,018.044	7,018.044	34.320	34.320	34.320	0.000	0.000	0.000	6,983.724	1.0205	7,126
	26/07/2017-25/08/2017	6,592.872	6,592.872	6,592.872	57.552	57.552	57.552	0.000	0.000	0.000	6,535.320	1.0205	6,669
	26/08/2017-25/09/2017	5,769.324	5,769.324	5,769.324	34.848	34.848	34.848	0.000	0.000	0.000	5,734.476	1.0205	5,852
	26/09/2017-25/10/2017	8,450.376	8,450.376	8,450.376	50.556	50.556	50.556	0.000	0.000	0.000	8,399.820	1.0205	8,572
	26/10/2017-25/11/2017	9,906.996	9,906.996	9,906.996	25.476	25.476	25.476	0.000	0.000	0.000	9,881.520	1.0205	10,084
	26/11/2017-25/12/2017	12,092.652	12,092.652	12,092.652	52.668	52.668	52.668	0.000	0.000	0.000	12,039.984	1.0205	12,286
	Subtotal			124,539.756			408.540			0.000	124,131.216		126,671
2018	26/12/2017-25/01/2018	11,245.608	11,245.608	11,245.608	58.872	58.872	58.872	0.000	0.000	0.000	11,186.736	1.0205	11,416
	26/01/2018-25/02/2018	12,409.056	12,409.056	12,409.056	34.188	34.188	34.188	0.000	0.000	0.000	12,374.868	1.0205	12,628
	26/02/2018-25/03/2018	15,213.924	15,213.924	15,213.924	22.968	22.968	22.968	0.000	0.000	0.000	15,190.956	1.0205	15,502
	26/03/2018-13/04/2018	8,071.404	8,071.404	8,071.404	11.220	11.220	11.220	0.000	0.000	0.000	8,060.184	1.0205	8,225
	Subtotal			46,939.992			127.248			0.000	46,812.744		47,771
Total		-		655,603.476	-		2,066.328	-		0.000	653,537.148		666,905