GOLD STANDARD FINAL VERIFICATION /CERTIFICATION REPORT

HEBEI YINGXIN GLASS GROUP CO. LTD. GLASS FURNACE FLUE GAS WASTE HEAT TO ENERGY PROJECT

Report No.: EC09(B)2018001

Report Date: 29/08/2018

China Classification Society Certification Company

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Project Name: Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat to Energy Project	
Host Country: People's Republic of China	
Certification body: China Classification Society Certification Company	**Client**: Swiss Carbon Assets Ltd.
Date of this revision: 29/08/2018	**Revision No.:** 2.0
GS ID.: 750	**Methodology:** ACM0012, version 3.2
Period covered by monitoring: 4th monitoring period from 01/01/2017 to 31/05/2018 (516 days, first and last days included)	

Verification Summary:

Swiss Carbon Assets Ltd. commissioned China Classification Society Certification Company (CCSC) to carry out the 4th periodic verification of Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat to Energy Project (GS ID: 750) covering the monitoring period from 01/01/2017 to 31/05/2018.

The verification process includes three phases: 1) desk review of documents; 2) on-site visit and follow-up interviews with the relevant personnel; 3) resolution of outstanding issues and the issuance of final verification report and opinion.

No Corrective Action Request (CAR) and No Forward Action Request (FAR) was raised in this monitoring period. 1 Clarification Request (CL) was raised in the verification process and successfully closed upon the project participant taken actions and submitted the monitoring report and supporting evidence. The verification team, through the verification process, confirmed that:

- All operations of the project are implemented and installed as planned and described in the validated project design document;
- The monitoring plan is in accordance with the applied methodology, i.e., ACM0012, version 3.2;
- The monitoring system is in place and functional;
- The installed equipment for measuring parameters required for calculating emission reductions are calibrated appropriately.

Based on the information observed and evaluated, the verification team confirms that the emission reductions are correctly calculated in the revised MR.

Therefore, CCSC certifies the emission reductions from Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat to Energy Project during the period 01/01/2017 to 31/05/2018 amount to 84,022 tCO_2e.

Work carried out by:	Team Leader: Mr. LI Xingtong Team Member: Mr. ZHOU Wusen
Technical Review by:	Ms. ZHANG Ying
Decision Making by:	Mr.YONG Hanlin, Ms. MA Zhiwei
Approved by:	Mr. HUANG Shiyuan

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ABBREVIATIONS

BE	Baseline emissions
CAR	Corrective Action Request
CCSC	China Classification Society Certification Company
CDM	Clean Development Mechanism
CL	Clarification request
CO_2	Carbon dioxide
DOE	Designated operational entity
DNA	Designated National Authority
EB	Executive Board
EF	Emission factor
ETN	Electricity Transaction Note
FAR	Forward action request
GHG	Greenhouse gas(es)
GS	Gold Standard
IPCC	Intergovernmental Panel on Climate Change
LE	Leakage emissions
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-governmental Organization
NCPG	North China Power Grid
PCP	Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PS	Project Standard
PA	Project Activity
SD	Sustainable Development
tCO_2e	Tonne of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VVS-PA	Validation and Verification Standard for Project Activity
WECM	Waste Energy Carrying Medium

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1. INTRODUCTION

Swiss Carbon Assets Ltd. commissioned China Classification Society Certification Company (CCSC) to verify the emission reductions of the GS project "**Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat to Energy Project**" with GS Ref. Number 750 (hereinafter referred to as "the Project"), for the monitoring period from 01/01/2017 to 31/05/2018, located in Donghuan Road, Shahe City (county-level city), Xingtai City, Hebei Province, China.

This report summarizes the findings of the verification of the Project, performed on the basis of Gold Standard (Version 2.1) requirements, UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

The project verification is the periodic independent review and ex-post determination by a DOE of the monitored reductions in GHG emissions during the defined verification period. In carrying out its verification work, the DOE shall ensure that the project activity complies with the requirements stated by Gold Standard.

Based on the applicable requirements, this assessment shall:

- Ensure that the project activity has been implemented and operated as per the registered PDD or any approved revised PDD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Ensure that the monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of GHG emission reductions and verifiable and in accordance with applicable CDM requirements;
- Ensure that the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan or any revised approved monitoring plan, and the approved methodology including applicable tool(s);
- Evaluate the data recorded and stored as per the monitoring methodology including applicable tool(s).

1.2 Scope

The verification scope covers the relevant documents (e.g. the registered PDD, the Gold Standard Passport, the Monitoring Report, the emission reduction calculation spreadsheet, supporting documents available to the verifier and information collected through performing interviews and on-site assessment, GS's tools and guidelines publicly available, relevant rules, including the host country legislation, etc.) to be independently reviewed, the project geographical locations to be visited on-site, the project relevant personnel to be interviewed with, and processes that are necessary to acquire objective evidence for the evaluation of the project compliance to the CDM verification requirements .

The above verification activities are conducted according to the CDM requirements. In doing so, the principles of accuracy, completeness, relevance, reliability and credibility were followed.

The verification is not meant to provide any consulting service towards the PPs. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project.

1.3 GS Project Description

The information of the project is summarized as the following table:

Project title:	Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat to Energy Project
GS registration number:	750
Registration Date:	30/09/2011
1st Monitoring Period:	01/01/2010 to 31/12/2011
2nd Monitoring Period:	01/01/2012 to 31/03/2014
3rd Monitoring Period:	01/04/2014 to 31/12/2016
4th Monitoring Period:	01/01/2017 to 31/05/2018
Project Participants:	(Host Party: China) Hebei Yingxin Glass Group Co. Ltd.
	(Other Party: Switzerland) Swiss Carbon Assets Ltd.
Methodology applied:	ACM0012 Version 3.2
Location of the Project:	Donghuan Road, Shahe City (county-level city), Xingtai City, Hebei Province, China
Geo coordinates:	36°51'18"N, 114°30'11"E

The Project is constructed and operated by Hebei Yingxin Glass Group Co. Ltd.. The waste heat of project is generated by four existing glass production lines. The waste heat is fed through waste heat pipes to four waste heat recovery boilers, which allow the feed water to recover the heat energy of low-temperature waste heat and convert it into superheated steam. Then steam is fed into the steam turbine through the steam pipe. The heat energy is converted into kinetic energy in the steam turbine to enable the turbine rotor to rotate at high speed, and then is converted into mechanical energy to drive the generator to rotate, and then electricity is generated.

The installed capacity of the project is 12MW. The power generated by the project connected to North China Power Grid (NCPG). The annual expected electricity is 76,000 MWh, and the annual estimated emission reductions are 67,906 tCO_2e. The total emission reductions for the fixed crediting period of 10 years are estimated as 679,060 tCO_2e. The implementation of the project is found to be in accordance with the registered PDD.

This is the 4th monitoring period of the Project. During this monitoring period from 01/01/2017 to 31/05/2018, the total emission reduction during this monitoring period is 84,022 tCO_2e.

2. VERIFICATION TEAM

The verification was conducted by a verification team that was designated by CCSC in accordance with its internal procedures. The competence and impartiality of the verification team are the key elements that have been taken into account by CCSC when appointing the verification team. The details of the verification team and technical reviewer are as follows:

Name	Role	Qualification	Sectoral Scope/Technical Area	Onsite Visit
LI Xingtong	Team leader	Verifier	TA1.1/TA1.2/TA3.1/TA9.2/ TA13.1	Yes
ZHOU Wusen	Team Member	Verifier	TA1.2	Yes
ZHANG Ying	Technical Reviewer	Verifier	TA1.1/TA1.2/TA8.1/TA10.1	No

The above verification team and technical reviewer are competent for conducting the verification and the impartiality is well guaranteed. Meanwhile, the Certificates of Competence are enclosed in Appendix B to this report.

3. METHODOLOGY

CCSC has assessed and determined that the implementation and operation of the project activity, and the steps taken to report emission reductions comply with the GS criteria, rules and relevant guidance provided by the GS Foundation and CDM-EB. The assessment involved a document review of relevant documentation as well as the on-site visit.

3.1 Desk Review of Documentation

A desk review of the MR (Version 01, dated 09/07/2018) and supporting documents were conducted by the verification team. For the details of CCSC reviewed:
- The registered GS-PDD for the project activity /3/, including the monitoring plan and the corresponding validation report /5/;
- The registered Gold Standard Passport for the project activity/4/ ;
- Monitoring Reports and Verification Reports for previous verifications /6//7/;
- The monitoring report of this monitoring period, including the claimed emission reductions for the project /1//2/;
- Baseline and monitoring methodology ACM0012 (version 3.2) /45/ applied by the project;
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board /42//43//44//45//46//47/;
- Relevant requirements and principles as required under the GS/48//49/;
- Other information and references relevant to the project activity /8/-/41/.

During the desk review, CCSC has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:
- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, the monitoring of SD indicators, and the quality assurance and quality control procedures; and

- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

[Double Counting Assessment]

The verification team has checked for double counting by reviewing all relevant registries, such as CDM (http://cdm.unfccc.int), VCS (http://www.v-c-s.org/), CCER (http://cdm.ccchina.gov.cn/ccer.aspx), and confirmed the project has not been registered as CDM project or under other voluntary carbon crediting scheme. The additional background documents related to the registered PDD, validation report, gold standard passport, the monitoring reports and the verification reports for previous monitoring period and etc., formed the basis of the final conclusion were as presented in Section 7 of this report.

Section 8 of this report contains a complete list of all documents and proofs reviewed by the verification team.

3.2 On Site Assessment

The verification team performed a site visit to the project site from 19/07/2018 to 20/07/2018. During the site visit, the verification team interviewed with the relevant personnel and verified that the actual implementation of the project was as described in the registered PDD. This includes the review of the project operation based on the evidence of on-site observation and presented documents.

During the on-site assessment, the verification team has interviewed with key personnel of the project owner (the project participant), the consultancy and related stakeholders. The detail of the on-site assessment including the interviewees and the main topics of the interview are summarized in the following table.

Date: 19/07/2018	
Person interviewed: **Hebei Yingxin Glass Group Co. Ltd.:** WANG LiangPeng: Electrical technician of power plant WANG Qingbo: Electrical technician of power plant WANG Yu: Electrical technician of power plant LIU Yanqiang: Electrical technician of power plant ZHANG Junping: Director of power plant **Swiss Carbon Assets Ltd.:** HU Lixiang, Project manager YANG Xuan, Head of implementation (China) **Local Residents:** YANG Mingxia CUI Qinghua	
Introduction of the project	The project is to install four waste heat recovery boilers to recover waste heat generated from the existing glass production lines of the company and

	convert waste heat into mechanical energy, which drives two sets of turbine-generator units with rated power of 6MW each for electricity generation. Hebei Yingxin Glass Group Co. Ltd. is the owner of both glass industrial facility and the project. All generated electricity is consumed by the glass production itself, and no energy is exported for sale. The details of the boilers, turbines and generators with respect to their number, type and model of the machines have been also introduced by the staff of the project during interview, and confirmed to be as per the GS-PDD.
Commissioning date of the project activity	The project completed construction and started trail operation on 12 August 2009
Power plant operation and maintenance during this monitoring period	As per the interview, the power plant operated smoothly during this monitoring period (01/01/2017 to 31/05/2018). There was no equipment overhauled, retrofit/modification of the power plant in this monitoring period.
Management and operational system, i.e. Organizational structure, responsibilities	As introduced by the project owner, they are responsible for operation and routine maintenance of power plant. The quality assurance and quality control procedures have been addressed in the GS project management and monitoring manual. Also, monitoring organization has been established referring to GS-PDD, i.e. the daily monitored data by shift staff have been checked first by the team leader and then by the power plant manager. The monthly summary reports have been also checked by the plant manager. The monitoring management system is implemented following the GS project management and monitoring manual.
Electricity monitoring and recording procedures	The electricity meters have been read by both the glass plant i.e. M081, M091 and the power generation plant i.e. M040, M050, M041, M051 and M045 separately. The power generation plant obtains the meter readings of M081 and M091 from the glass plant side by phone. The power generation plant manager is responsible for confirming the daily monitored data and monthly monitoring report.

Gap between the electricity measured by main meters (M091 and M081) and backup meters (M041 and M051)	Based on the discussion with the project owner during on-site interview, it was clarified that the main meters M091 and M081 are located at glass plant side, and the backup meters M041 and M051 are located at power plant side. Thus, there is line loss between main meters and backup meters. There are four lines between generation side (M041 and M051) and recipient side (M081 and M091), two parallel lines connected M051 and M091 (line M051-M091), and two parallel lines connected M041 and M081 (line M041-M081). And the actual line loss is slightly higher than the theoretical values.
Calibration of electricity meters	According to GS-PDD the calibration frequency of all meters is once a year. However, the monitoring meters have been calibrated once with their calibrations valid for 5 years. The calibrations are all in accordance with the requirements of "Verification Regulation of Electrical Energy Meters with Electronics" (JJG596-1999). Since the calibration was performed each five year instead of annually, the emission reductions are recalculated by applying the maximum permissible error (0.5%) of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration according to the Project Standard.
Training for employees	Series of trainings provided to all employees annually regarding safety and operation, fire protection, monitoring, etc.
SD indicators monitoring, and records	As clarified by the staff, all SD indicators were monitored in accordance with the Passport, which was conducted by the third qualified party or internal check, the monitoring results and frequency were in line with the local regulation and the Passport. It was confirmed by CCSC with checking monitoring certificates and related records during on-site visit.

HR and employment of female	As per the staff interviewed during on-site visit, there are totally 24 employees in the plant, including 1 female. All employees are well trained and qualified, and they were satisfied with their salary. The female staff is not engaged in dangerous and strenuous work, and are employed under the same salary condition and training courses as the male staff.
Working environment satisfaction of the employee	As introduced by the staff during on-site visit, they are well protected in their workplace, and satisfied with the working environment. For example: Noise: The mitigation measures are implemented i.e. Noise reduction equipment and personal protective equipment. The noise is monitored every year and results are below the allowable limit of the national standard. Air quality during operation period in workplace of whole glass plant area after the project activity: The plant site is far away from the office area and neighboring residential area. The air quality is monitored every year, and results are below the allowable limit of the national standard Water quality: The waste water i.e. circulating cooling water, boiler blow down water and municipal wastewater are well treated by the wastewater treatment system as design. The sewage from the plant has been discharged to the municipal sewage system after the lagoon treatment at the plant site. The water quality is monitored every year, and results are below the allowable limit of the national standard. Fire protection: The fire protection system is in the boiler rooms and the power generation room. The certificate of qualification of the plant's fire protection system has been issued by local safety Bureau. Safe and healthy work environment for

	workers of the whole plant: Every staff participates the training of the employees regarding safety and operation every year. The plant has achieved the certificate of conformance of the safe and healthy working environment. Furnace waste refractory brick disposal: A contract has been signed with brick supplier for recycling use. The brick disposal is recorded on daily basis. During this monitoring period, there was no furnace waste refractory brick occurred.
The reason for the change of the Shahe Environmental Protection Monitoring Center has followed the national standard of the national standards for noise, i.e. It was referred to GB12348-1990 in GS-PDD, while it was GB12348-2008 in the MR.	The Shahe Environmental Protection Monitoring Center has followed the national standard of GB12348-1990, which was a national standard and widely used in the industry. This standard has been updated since October 2008. Thus, in MR the standard GB12348-2008 has been referred.

3.3 Resolution of CARs and CLs and FARs

The objective of this phase of the verification is to resolve any outstanding issues (issues that require further elaboration, research or expansion) which have to be clarified prior to CCSC's positive conclusions on the project implementation, monitoring practices and achieved emission reductions.

Findings established during the verification can either be interpreted as a non-compliance with GS/UNFCCC criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

A Corrective Action Request (CAR) will be raised if one of the following occurs:

(a) Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

(b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;(c

(c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

(d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

A Clarification Request (CL) will be raised if information is insufficient or not clear enough to determine whether the applicable GS/UNFCCC requirements have been met.

A Forward Action Request (FAR) will be raised, for actions if the monitoring and reporting require attention and/or adjustment for the next verification period. A FAR shall not relate to the GS/UNFCCC requirements for issuance.

After completion of the above two phases (phase 3.1 and phase 3.2), the verification team identified **0** CAR, **0** FAR, **1** CL in this monitoring period. The findings were satisfactorily addressed by the project participants in the monitoring report (refer to Section 6 of this report for further details).

The final verification conclusion presented in this report is based on the revised MR and additional information or evidence provided by the PP. The verification team completed the verification report and submitted it for technical review, decision making and final approval.

3.4 Internal quality control

CCSC has taken the following quality control measures within the verification team and of the verification process according to relevant CCSC's internal procedures:

- The application review of the verification was conducted and concluded that CCSC has the accredited scope and competence to verify the project with impartiality as well;
- The verification team was selected with due considerations given in terms of the competence and impartiality;
- The verification team carried out the verification work and compiled a verification report strictly following CCSC's Procedures for Implementation of Verification.

The verification report submitted by the verification team was subjected to a technical review and decision-making process, the technical reviewers and decision-makers are qualified and independent from the verification team. If any issue is raised during technical review and/or decision-making the same is to be discussed between the issue-raiser and the team leader as well as the PP. All issues must be satisfactorily addressed before the submission of the report for final approval. The Certificates of Competence of the persons who conducted the technical review and decision-making for the project can be found in Appendix B of this report.

The report approved by the authorized official of CCSC as the final report together with relevant documents is submitted to the GS for request for issuance.

4. VERIFICATION FINDINGS – VERIFICATION OF COMPLIANCE

In the following sections, the conclusions of the verification are stated.

The findings from the desk review of the original monitoring documents and the findings from interviews during the follow up visit are described in this section of the report.

4.1 Assessment of remaining issues from the previous validation/verification period

After verifying the previous verification reports and GS Issuance Review report, CCSC verification team confirmed that no FAR was remained from the previous verification process.

4.2 Compliance of the project implementation with the registered project design document

The CCSC verification team has conducted an on-site visit at Donghuan Road, Shahe City (county-level city), Xingtai City, Hebei Province, P.R. China to verify the actual installation of the Project against the description in its registered PDD and found that: two sets of turbine-generator units with rated power of 6MW each have been installed and operated.

As per the registered GS-PDD of the project /3/, it stated fixed crediting period was selected and the starting date of the crediting period is 1 January 2010. The project activity was registered as GS project on 30 September 2011. As stated in the first verification report /7/ and by checking daily operation and maintenance records /15/ during on-site visit, CCSC confirmed the project completed construction and started trail operation on 12 August 2009, and as a result GS monitoring started from 1 January 2010. The selected 4th monitoring period (from 01/01/2017 to 31/05/2018) is within the fixed crediting period 1 January 2010 to 31 December 2019.

The details of the boiler, turbine and generator with respect to their number, type and model of the machines have been verified during the on-site visit. CCSC has verified that the waste heat recovery power plant included the installation of four waste heat recovery boilers and two sets of turbine-generator units with rated power of 6MW each, and confirmed to be as per the GS-PDD.

The control system at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment.

During on-site interview and by checking the daily operation and maintenance records /15/, there was no equipment overhauled in this monitoring period. No retrofit/modification was found for the project activity by checking the plant operation and maintenance records /15/ and interviewing with the manager and operator. CCSC confirmed that the plant was under a normal operation as expected in this monitoring period.

On-site training for the GS related procedures including monitoring, recording and reporting was verified to be in place /11/ and their implementation was confirmed by interview with the key operators and observing the operation.

As part of the site visit, CCSC was able to confirm that the project implementation is in accordance with the project description contained in the GS-PDD (version 2.0 dated 11 November 2010). The verification team confirmed through visual inspection and document review that all physical features of the proposed GS project activity including data collection systems and storage systems have been implemented in accordance with the GS-PDD /3/.

4.3 Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) and the standardized baseline

The verification team has verified the monitoring plan, including the data and parameters required to be monitored, measurement procedures, monitoring frequency and QC/QA procedures as described in the registered PDD.

Corresponding to the paragraph 388 of VVS-PA Version 01.0, the verification team can confirm that the monitoring plan monitoring plan in the GS-PDD (version 2.0 dated 11 November 2010)/3/ is in accordance with the approved methodology ACM0012 (version 3.2) /46/ including applicable tool(s) applied by the Project.

4.4 Compliance of monitoring activities with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the PDD (version 2.0 dated 11 November 2010) /3/ and Passport version 2 dated 8 May 2011. CCSC confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0012 (version 3.2) /45/, and the management system were assessed during the site visit. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for the each parameter in further verified in the following sections.

Factor and data determined ex-ante

All reported factors determined ex-ante by the monitoring methodology ACM0012 (version 3.2) and indicated in the GS-PDD (version 2.0 dated 11 November 2010) were assessed as follows:

a. Baseline emission factor of NCPG($EF_{grid,CM,y}$)

In the GS-PDD, the ex-ante determined emission factor 0.8935 tCO2/MWh for the NCPG is applied during the crediting period (including this monitoring period).

b. Output energy (electricity) that can be theoretically produced ($Q_{OE, BL}$)

Output energy (electricity) that can be theoretically produced (in MWh) is determined on the basis of maximum recoverable energy from the WECM, which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of project activity ($Q_{OE, BL}$).

As per the GS-PDD, the value of 86,400 MWh (the total electricity generation) for a year for $Q_{OE,BL}$ is applied in the calculation of fcap.

Factors and data monitored or calculated ex-post

The below tables describe for each parameter, which is to be measured according to the monitoring plan, how CCSC has verified that: 1) the actual monitoring complies with the monitoring plan and that 2) data have been assessed to correctly support the emission reductions being claimed.

Data / Parameter* No.1*: Electricity exported by the project activity to the plant during year y in MWh (EGexport,y)

Measuring frequency	Continuously

Reporting frequency	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology	The measuring frequency (continuously) is to read and record data on daily basis and aggregated monthly in accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practice.
Type of monitoring equipment	Electricity meters
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology	Main meter M081 /9/ Type/Model: DSSD904 SN: 006513 Accuracy: 0.5S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 Main meter M091 /9/ Type/Model: DSSD904 SN: 006519 Accuracy: 0.5S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 Glass plant fan line meter M045 /9/ Type/Model: DSSD331 SN: 550476 Accuracy: 0.5 Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 12 September 2016 Calibration validity: 11 September 2021 The calibration certificates for all meters are valid for 5 years which meets the requirement from the relevant national standard /33//34/ and reflects to the monitoring practice of China. However, as stated in the GS-PDD the calibration frequency is once a year. Hence, the calibration had not been conducted appropriately as per the monitoring plan. As a result, there is a calibration delay for M091, M081 and M045 during this monitoring period. Therefore, to assess the

	time gap of calibrations, the maximum permissible error (the accuracy) of the instruments was used to decrease the measured values taken for the electricity export. For meters M081 and M091 with accuracy 0.5S (0.5%) and meter M045 with accuracy 0.5 (0.5%), the accuracy of 0.5% was applied for this monitoring period. It is conservative and reasonable. As per the GS-PDD, the standard of Technical Administrative Code of Electric Energy Metering (DL/T448-2000) /33/ was applied for calibration. However as the local calibration entity applies the Verification Regulation of Electrical Energy Meters with Electronics (JJG596-1999) /34/ which is also a national standard and widely used in the industry, and thus acceptable.
Assessment of how to verify the reported values in the monitoring report	The amount of electricity export is determined by monitoring meters on the hourly and daily basis when the power plant is operating, and these daily readings /17/ are aggregated into monthly reports. CCSC has verified these values to be consistent with the information used in the ER spreadsheet /2/.
Assessment of how to cross-check the reported values with other available data	The meter reading was usually recorded at the 25th each month jointly by the power plant and glass plant, which could be cross checked between main meter and back up meter. However, there is no cross check measure (other available data such as electricity purchase agreement/invoice) indicated for electricity export in the monitoring plan of the GS-PDD. CCSC has verified the quality assurance and quality control procedures from the project, and interviewed with the project implementation team. CCSC confirmed that the project team is able to conduct the management and monitoring well, and recorded values are reasonable and acceptable.

Data / Parameter* No.2*: Electricity imported by the project activity to the plant during year y in MWh (EGimport,y)

Measuring frequency	Continuously
Reporting frequency	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology	The measuring frequency (continuously) is to read and record data on daily basis and aggregated monthly in accordance with the monitoring plan and monitoring methodology. Since there is not specific

	requirement for reporting frequency in the monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practice.
Type of monitoring equipment	Electricity meters
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology	Main meter M081 /9/ Type/Model: DSSD904 SN: 006513 Accuracy: 0.5S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 Main meter M091 /9/ Type/Model: DSSD904 SN: 006519 Accuracy: 0.5S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 In the GS-PDD, it stated the accuracy of meters for monitoring electricity import will not worse than 0.5. The main meters M081 and M091 have the accuracy of 0.5S (0.5%) which are consistent with the value stipulated in the GS-PDD. During the on-site visit, all the calibration records were reviewed. The calibration certificates for all meters are valid for 5 years which meets the requirement from the relevant national standard /33//34/ and reflects to the monitoring practice of China. However, as stated in the GS-PDD the calibration frequency is once a year. Hence, the calibration had not been conducted appropriately as per the monitoring plan. As a result, there is a calibration delay for M081 and M091 during this monitoring Period. Therefore, to assess the time gap of calibrations, the maximum permissible error (the accuracy) of the instruments was used to increase the measured values taken for the electricity import. For meters M081 and M091, the accuracy 0.5S (0.5%) was applied for this monitoring period. It is conservative and reasonable.

	As per the GS-PDD, the standard of Technical Administrative Code of Electric Energy Metering (DL/T448-2000) /33/ was applied for calibration. However as the local calibration entity applies the Verification Regulation of Electrical Energy Meters with Electronics (JJG596-1999) /34/, which is also a national standard and widely used in the industry, and thus acceptable.
Assessment of how to verify the reported values in the monitoring report	The amount of electricity import is determined by monitoring meters on the hourly and daily basis when the power plant is operating, and these daily readings /16/ are aggregated into monthly reports. CCSC has verified these values to be consistent with the information used in the ER spreadsheet /2/.
Assessment of how to cross-check the reported values with other available data	The meter reading was usually recorded at the 25th each month jointly by the power plant and glass plant. There is no cross check measure indicated for electricity import in the monitoring plan of the GS-PDD, CCSC has verified the quality assurance and quality control procedures from the project, and interviewed with the project implementation team. CCSC confirmed that the project team is able to conduct the management and monitoring well, and recorded values are reasonable and acceptable.

Data / Parameter* No.3*: Net electricity output by the project activity during year y in MWh (EGy)

Measuring frequency	Calculated value
Reporting frequency	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology	This value is calculated from the data of EGexport,y and EGimport,y on daily basis and aggregated monthly in accordance with the monitoring plan and monitoring methodology.
Type of monitoring equipment	Calculated value from EGexport,y and EGimport,y
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology	Calculated value from EGexport,y and EGimport,y, and relevant information for monitoring equipment refer to the monitoring parameters EGexport,y and EGimport,y. Since the calculation result was crosschecked with data measured at generation plant, the accuracy and calibration of the backup meters installed at generation plant are assessed as follows: Back up meter M041 Type/Model: DSSD331

	SN: 500005 Accuracy: 0.2S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 Back up meter M051 Type/Model: DSSD331 SN: 500001 Accuracy: 0.2S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 The accuracy and calibration of meters M081, M091 and M045 have been discussed above. In the GS-PDD, it stated the accuracy of meters for monitoring electricity will not worse than 0.5. The accuracy of backup meters M041 and M051 of 0.2S (0.2%) are higher than the value described in the GS-PDD, and also represent good monitoring practice. During the on-site visit, all the calibration records /9/ were reviewed. The calibration certificates are valid for 5 years which meets the requirement from the relevant national standard /33//34/ and reflects to the monitoring practice of China. As per the GS-PDD, the standard of Technical Administrative Code of Electric Energy Metering (DL/T448-2000) /33/ was applied for calibration. However, as the local calibration entity applies the Verification Regulation of Electrical Energy Meters with Electronics (JJG596-1999) /34/, which is also a national standard and widely used in the industry, and thus acceptable. As stated in the GS-PDD the calibration frequency is once a year. Hence, the calibration had not been conducted appropriately as per the monitoring plan. Since main meters M091 and M081, and glass plant fan line meter M045 directly monitored electricity export and import. Therefore, to assess the time gap of

	calibrations, the maximum permissible error (the accuracy) of the instruments was used to decrease the measured values taken for the electricity export, while to increase the measured values taken for the electricity import. For meters M081 and M091, the accuracy 0.5S (0.5%) was applied for this monitoring period. For meter M045 the accuracy 0.5 (0.5%) was applied. It is conservative and reasonable.
Assessment of how to verify the reported values in the monitoring report	The net electricity supplied to the grid is determined by the electricity export to the glass plant and glass plant fan minus the electricity import, and aggregated into monthly reports. CCSC has verified these values to be consistent with the information used in the ER spreadsheet /2/.
Assessment of how to cross-check the reported values with other available data	The meter reading was recorded usually at the 25th each month jointly by the project owner and glass plant. According to the monitoring plan of the GS-PDD, the net electricity measured by main meters will be crosschecked with data measured at generation plant. During on-site visit, CCSC confirmed meters M051 and M041 which were installed at power plant are the backup meters for cross checking the net electricity measured by main meter M091 and M081 installed at glass plant side /17/. There are four lines between generation side (M041 and M051) and recipient side of glass plant (M081 and M091), two parallel lines connected M051 and M091 (line M051-M091), and two parallel lines connected M041 and M081 (line M041-M081). Based on monitoring data on daily basis and aggregated monthly, the actual line loss for line M051-M091 and line M041-M081 are 0.72% and 0.72% in average respectively. respectively, in each year as follow: M051-M091 2017: 0.65% 2018: 0.69% M041-M081 2017: 0.64% 2018: 0.61% The calculation measure for theoretical line loss has been provided in the ERs spreadsheet /2/.

	As verified the calculation of line loss the actual line loss is slightly higher than the theoretical values. CCSC considers that the line loss between generation side and recipient side is reasonable. Meter M045 is used for directly monitoring electricity export supplied to glass plant fan line. However, there was not a backup meter for M045, thus it is not available to cross-check the records of M045. CCSC has verified the quality assurance and quality control procedures from the project, and interviewed with the project implementation team. CCSC confirmed that the project team is able to conduct the management and monitoring well, and recorded values are reasonable and acceptable.

Data / Parameter* No.*4: Quantity of total electricity generation during year y in MWh ($Q_{OE,y}$)

Measuring frequency	Continuously
Reporting frequency	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology	The measuring frequency (continuously) is to read and record data on daily basis and aggregated monthly in accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practice.
Type of monitoring equipment	Electricity meters
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology	Meter M040 /9/ Type/Model: DSSD331 SN: 500004 Accuracy: 0.2S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016 Calibration validity: 14 October 2021 Meter M050 /9/ Type/Model: DSSD331 SN: 500006 Accuracy: 0.2S Calibration frequency: annual Calibration entity: Shahe Power Supply Company/10/ Calibration date: 15 October 2016

	Calibration validity: 14 October 2021 In the GS-PDD, it stated the accuracy of meters for monitoring electricity generation will not worse than 1.0. The meters M040 and M050 have the accuracy of 0.2S (0.2%) are higher than the value described in the GS-PDD, and also represent good monitoring practice. During the on-site visit, all the calibration records /9/ were reviewed. The calibration certificates for both meters are valid for 5 years which meets the requirement from the relevant national standard /33//34/ and reflects to the monitoring practice of China. However, as stated in the GS-PDD the calibration frequency is once a year. Hence, the calibration had not been conducted appropriately as per the monitoring plan, which cannot cover the whole monitoring period 01/01/2017 to 31/05/2018. As a result, there is a calibration delay for M040 and M050 during this monitoring period. For meters M050 and M040, they are used to directly monitor electricity generation ($Q_{OE,y}$) for determining fcap. Therefore, to assess the time gap of calibrations, the maximum permissible error (the accuracy) of the instruments was used to increase the measured values taken for the electricity generation. For meters M040 and M050 the accuracy 0.2S (0.2%) was for this monitoring period. It is conservative and reasonable. As per the GS-PDD, the standard of Technical Administrative Code of Electric Energy Metering (DL/T448-2000) /33/ was applied for calibration. However as the local calibration entity applies the Verification Regulation of Electrical Energy Meters with Electronics (JJG596-1999) /34/, which is also a national standard and widely used in the industry, and thus acceptable.
Assessment of how to verify the reported values in the monitoring report	The amount of electricity generation is determined by monitoring meters on the hourly and daily basis when the power plant is operating, and these daily readings /17/ are aggregated into monthly reports. CCSC has verified these values to be consistent with the information used in the ER spreadsheet /2/.
Assessment of how to cross-check the	The meter reading was recorded at the 25th

reported values with other available data	each month jointly by the project owner and glass plant. There is no cross check measure indicated for electricity generation in the monitoring plan of the GS-PDD, CCSC has verified the quality assurance and quality control procedures from the project, and interviewed with the project implementation team. CCSC confirmed that the project team is able to conduct the management and monitoring well, and recorded values are reasonable and acceptable.

4.5 Compliance with the calibration frequency requirements for measuring instruments

During this monitoring period, the installed measuring meters have been operating well and were duly calibrated as per the monitoring plan in the registered PDD. The calibration records are shown in Table 1 below.

Table 1. The calibration records of the meters

Meter Measuring	Tag No.	Meter Serial No.	Meter type and model	Specific location	Accuracy (%)	Calibration date (dd/mm/yy)	Valid until (dd/mm/yy)	Certificate No.
QOE,y	050	500006	DSSD331	Generator	0.2S	15/10/2016	14/10/2021	20161016012
QOE,y	040	500004	DSSD331	Generator	0.2S	15/10/2016	14/10/2021	20161016004
EGexport,y EGimport,y	051	500001	DSSD331	Control room	0.2S	15/10/2016	14/10/2021	20161016014
EGexport,y EGimport,y	041	500005	DSSD331	Control room	0.2S	15/10/2016	14/10/2021	20161016063
EGexport,y	045	550476	DSSD331	Control room	0.5	12/09/2016	11/09/2021	20161016021
EGexport,y EGimport,y	081	006513	DSSD904	Glass furnace room	0.5S	15/10/2016	14/10/2021	20161016102
EGexport,y EGimport,y	091	006519	DSSD904	Glass furnace room	0.5S	15/10/2016d	14/10/2021	20161016011
Calibration Entity: Shahe Power Supply Company Note：Bureau of Technical Supervision of Xingtai City: Ceritificate of Metrological Authorization for Special Items of Shahe Power Supply Company. issued on 06 Aug 2014 valid till 05 Aug 2018 Details refer to Section 4.4 - the Factors and data monitored or calculated ex-post - Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.								

[Instrument accuracy]

The verification team has verified the calibration reports and the accreditation certificates of the calibration entity. All the meters meet the rated accuracy level as described in the monitoring plan of the registered PDD.

[Calibration frequency]

The calibration frequency fulfills the requirement as described in the monitoring plan of the registered PDD and complied with the national standards.

As per Para. 400 of VVS-PA Version 01.0, the verification team confirms that: The calibration is conducted at the frequency as specified by the methodology and the monitoring plan contained in the registered PDD.

4.6 Gold Standard requirements – Sustainable Development indicators

#GS1: Air Quality during construction period

Chosen parameter	Dust development during construction
Target value as per the MP	Potential dust development during construction shall be controlled within the plant area
Assessment of the mitigation measures	N/A As per the validated and approved Gold Standard Passport, air quality during construction period was required to be monitored once upon validation, and was verified by DOE during validation. Hence, the indicator is not involved during verification.
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	N/A
Assessment of how to verify the reported values in the monitoring report	N/A

#GS2: Air Quality during operating period

Chosen parameter	Dust and SO2 concentration at exhaust pipe
Target value as per the MP	Lower dust concentration is expected
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and	The monitoring frequency is annually as per the

monitoring methodology	monitoring plan. During on-site visit, CCSC verified that the air quality during operation period was reported on 27/12/2017 by Shahe Environmental Protection Monitoring Center . Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring. Since the report of the dust and SO2 concentration at exhaust pipe has not been issued in 2018 till this verification, the PP did not provide the 2018 report of the dust and SO_2 concentration at exhaust pipe.
Assessment of how to verify the reported values in the monitoring report	As indicated in the air quality analysis report /18/ the dust and SO_2 concentration at exhaust pipe were below the allowable limit of the national standard/36/. Hence CCSC confirmed the indicator was satisfied.

#GS3: Quality of employment

Chosen parameter	Permanent job positions Workplace air quality Fire protection measures
Target value as per the MP	24 (job positions created solely by the PA); The workplace air quality follows national standard (GBJ16-87 and GBZ1-2002) /37//38/; The fire protection equipments are in place, and the employees receive fire protection training
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annually as per the monitoring plan. During on-site visit, CCSC verified: - The HR records /20/ of the power plant was recorded in 2017. Since the record has not been issued in 2018 till this verification, the PP did not provide the 2018 record; - The workplace air quality was measured on 29/11/2017 by Shahe Environmental Protection Monitoring Center. Since the report has not been issued in 2018 till this verification, the PP did not provide the 2018

	report; - The fire protection equipments were in place and recorded, and the training of the employees regarding safety and operation were conducted on 01/06/2011. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan.
Assessment of how to verify the reported values in the monitoring report	CCSC confirmed with HR records that the power plant employed 24 employees for operation of the project facilities. This was also verified by interviewing with the staff. For workplace air quality, as indicated in the workplace air quality analysis report, no benzene, sulfur trioxide and hydrogen-fluoride nor toxic gas were detected which meets the targeted national standard GBJ16-87 and GBZ1-2002 /37//38/. During on-site visit, CCSC visually verified the fire protection system was in place in the boiler rooms and the power generation rooms appropriately. Also CCSC checked the conformity with the certificate of qualification of the plant's fire protection system issued by local safety bureau. CCSC also confirmed the training of the employees regarding safety and operation, and the relevant examination to staff with their records.

#GS4: Human and institutional capacity

Chosen parameter	Female employment (number and job related education).
Target value as per the MP	≥ 1
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annually as per the monitoring plan. During on-site visit, CCSC verified that the HR records of the

	power plant were recorded in 2017. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan. Since the HR records of the year 2018 has not been issued till this verification, the PP did not provide the 2018 HR records.
Assessment of how to verify the reported values in the monitoring report	During on-site visit, CCSC confirmed with HR records that the power plant employed 1 female employee who was employed under the same salary conditions as male staff, which was also verified with the interview with the staff. This clearly satisfies the future target equals to or more than one staff. CCSC also confirmed the training of the employees (both male and female) regarding safety and operation, and the relevant examination to the staff with their records. Hence CCSC confirmed the indicator was satisfied.

#GS5: Quantitative employment and income generation

Chosen parameter	Number of jobs and income satisfaction rate
Target value as per the MP	Permanent job positions created solely by the PA: Number of jobs: 24 positions The employees are satisfied with the income.
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annually as per the monitoring plan. During on-site visit, CCSC verified that the HR records of the power plant were recorded in 2017. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan. Since the HR records of the year 2018 has not been issued till this

	verification, the PP did not provide the 2018 HR records.
Assessment of how to verify the reported values in the monitoring report	CCSC confirmed 24 staffs were employed for the operation of the power plant already argued above, and they were satisfied with their salary by checking the result of employee satisfaction survey in year 2017. Further this was confirmed through the interview with the staff during the site visit. Hence CCSC confirmed the indicator was satisfied.

#GS6: Noise

Chosen parameter	Implementation of noise reduction equipment for generators and protection measures for personnel
Target value as per the MP	The noise reduction equipment and personal protective equipment is implemented. The noise level follows the national standards, i.e. GBJ 87-85 and GB12348-1990 /37//38/.
Assessment of the mitigation measures	As stated in the monitoring plan, the mitigation measure is to install noise reduction equipment and protection measures for personnel. During on-site visit, CCSC confirmed that the turbines and generators are covered for noise protection and safety. The operating room of the power plant was separated from the turbines and generators room for air conditioning and noise protection. The boilers are installed inside the boiler house, where usually no operators are stationed and their operating conditions are monitored remotely. Hence CCSC confirmed the mitigation measure was placed.
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annual as per the monitoring plan. During on-site visit, CCSC verified that the noise during operation period was measured on 10/10/2017 and 11/10/2017 by Shahe Environmental Protection Monitoring Center. Hence, CCSC confirmed the

	monitoring frequency is in accordance with the monitoring plan. Since the report of noise measurements of the year 2018 has not been issued till this verification, the PP did not provide the 2018 report.
Assessment of how to verify the reported values in the monitoring report	For noise analysis, the Shahe Environmental Protection Monitoring Center applied the national standard GB12348-2008 which replaced GB12348-1990 since October 2008 and widely used in the industry. As indicated in the noise analysis report, the around the site day and night was below the allowable limit of the national standard. Hence CCSC confirmed the indicator was satisfied.

#GS7: Water quality

Chosen parameter	Wastewater treatment
Target value as per the MP	Circulating cooling water, boiler blow down water and municipal wastewater properly treated, as per national standards.
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annually as per the monitoring plan. During on-site visit, CCSC verified that the water quality was measured on 12/09/2017 by Shahe Environmental Protection Monitoring Center. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan. Since the 2018 report of wastewater treatment has not been issued till this verification, the PP did not provide the 2018 report.
Assessment of how to verify the reported values in the monitoring report	As indicated in the water quality analysis report, the quality of discharged wastewater satisfied the national standard. During on-site visit, CCSC checked the flow-diagram of the wastewater treatment plant confirmed that the wastewater treatment system of the power plant was

	placed, and the wastewater has been treated appropriately. The sewage from the plant has been discharged to the municipal sewage system after the lagoon treatment in the plant site, while the circulating cooling water and the boiler discharge water have been discharged directly to the system without treatment, as being not contaminated. Hence CCSC confirmed the indicator was satisfied.

#GS8: Air quality of whole glass plant area after the PA

Chosen parameter	Dust and SO2 concentration in atmosphere
Target value as per the MP	Dust concentration<0.15 mg/m3, SO2< 0.30 mg/m3
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is once upon the first verification as per the monitoring plan, which has been verified by the first verification. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan and covering this monitoring period.
Assessment of how to verify the reported values in the monitoring report	As indicated in the air quality analysis report, the dust and SO2 concentration in atmosphere were lower than the target value and satisfied the national standards, which was verified during first verification. Hence CCSC confirmed the indicator was satisfied.

#GS9: Safe and healthy work environment for workers of the whole plant

Chosen parameter	Plant safety regulation and training; Work environment status
Target value as per the MP	The plant safety measures are in place; Work environment is healthy

Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annual as per the monitoring plan. The training of the employees regarding safety and operation were conducted in 03/2017, 04/2017, 11/2017, 12/2017, 03/2018 and 04/2018 /11/. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan and covering this monitoring period.
Assessment of how to verify the reported values in the monitoring report	During on-site visit, CCSC reviewed training records and interviewed with employee, and confirmed the safe and healthy work environment for workers of the plant has been achieved. CCSC also verified the achievement with the certificate of conformance of the safe and healthy working environment issued on 10 August 2012 valid till 9 August 2015, 10 August 2015 valid till 9 August 2018. Hence CCSC confirmed the indicator was satisfied.

#GS10: Furnace waste refractory brick disposal

Chosen parameter	Furnace waste refractory brick disposal with proper hazardous waste management measures
Target value as per the MP	Status quo ante
Assessment of the mitigation measures	N/A as per monitoring plan
Assessment of monitoring frequency in accordance with the monitoring plan and monitoring methodology	The monitoring frequency is annual as per the monitoring plan. The power plant operation and glass plant manufacturing were recorded daily basis. Hence, CCSC confirmed the monitoring frequency is in accordance with the monitoring plan and covering this monitoring period.
Assessment of how to verify the reported	During on-site visit, CCSC reviewed the power plant operation records and glass plant manufacturing records, and confirmed

values in the monitoring report	there were no furnace waste refractory brick occurred during this monitoring period. CCSC also verified the waste brick supply contract has been signed that the waste refractory brick will be sold to the brick supplier for recycling use. Hence CCSC confirmed the indicator was satisfied.

4.7 Assessment of data and calculation of emission reductions

CCSC confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

CCSC has checked the monitored data regarding electricity supply and electricity generation against monitoring records/16//17/, and confirmed the consistency and correctness for all calculation-related data. The process and result are shown as below:

Baseline emissions

Baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor ($EF_{grid,CM,y}$ in tCO2/MWh) times the net electricity supplied by the project activity (EG_y in MWh), which will otherwise be supplied by the NCPG without the project activity. Baseline emissions are given as:

$$BEy = f_{cap} \times EG_y \times EF_{grid,CM,y}$$

Where,

BE_y : Baseline emissions due to displacement of electricity during the year y in tons of CO_2

EG_y : Net quantity of electricity supplied to the glass plant by the project.

$EF_{grid,CM,y}$:CO_2 emission factor for the electricity displaced due to the project activity during the year y, which is fixed ex-ante as 0.8935 tCO2/MWh for the whole crediting period according to registered GS PDD and has been verified in validation report.

f_{cap} Energy that would have been produced in project year y using waste energy generated in base year expressed as a fraction of total energy produced using waste source in year y.

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

Where,

EGexport,y Electricity exported by the project activity to the plant during year y in MWh.

EGimport,y Electricity imported by the Project activity from the grid during year y in MWh.

$$f_{cap} = Q_{OE,\,BL} / Q_{OE,\,y}$$

Where,

$Q_{OE,\,BL}$:Output energy that can be theoretically produced (MWh), to be determined on the basis of maximum recoverable energy from the Waste Energy Carrying Medium (WECM),

which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of the project activity.

$Q_{OE, y}$:Quantity of actual output energy (electricity) during year y (MWh), which will be monitored ex-post /3/.

For year 2017:

$Q_{OE, BL}/Q_{OE, 2017}$ = 86,400/72700.83>1, therefore fcap for year 2017 = 1 according to ACM0012. The net electricity supplied to the glass plant is 66364MWh in 2017 which result in the baseline emission reductions 59296.55tCO2e.

For year 2018 (01/01/2018 to 31/05/2018):

$Q_{OE, BL}/Q_{OE, 2018}$ = 35744/31370.43>1, therefore fcap for year 2018 = 1 according to ACM0012. The net electricity supplied to the glass plant is 31352MWh in 2018 which result in the baseline emission reductions 24726.06tCO2e.

As a result, the baseline emission reductions are round-down to be 84,022 tCO2e in this monitoring period.

Project emissions

The project emissions are not accounted for as defined to be zero in the GS-PDD /3/ as per the applied methodology ACM0012, version 3.2 /45/. No auxiliary fuels are used and gas cleaning for the proposed project activity, CCSC was able to confirm by on-site visit. Hence the project emission is zero.

Leakage

In line with the GS-PDD /3/ and ACM0012 version 3.2 /45/, leakage emissions are deemed negligible and therefore considered to be zero.

Emission reductions

The emission reductions (ERy) by the project activity is the difference between the baseline emissions (BEy) and project emissions (PEy).

ERy = BEy - PEy

BEy = 84,022 tCO_2e

PEy = 0 tCO_2e

Hence, the emission reductions (ERy) by the project activity during this monitoring period are calculated to be 84,022 tCO_2e. The emission reduction calculations have been based on actual monitored data of the plant and the estimation or default values in this monitoring period, from 01/01/2017 to 31/05/2018 which have been verified by CCSC. Emission reduction calculations were presented in a worksheet /2/ and CCSC has assessed the calculations to be complete and transparent.

The emission reductions in this monitoring period 01/01/2017 to 31/05/2018 (i.e. 516 days) are totally 84,022 tCO_2e, respectively, 59,296 tCO_2e for 2017, 24,726 tCO_2e for 2018. The expected emission reductions according to the PDD are totally 95,999 tCO2e, respectively, 67,906 tCO_2e for 2017, 28,093tCO_2e for 2018. which corresponds to the emission reductions of 95,999 tCO_2e for this monitoring period (i.e. 516 days). Hence, the reported emission reductions are 12.5% lower than the estimation in the PDD. In this monitoring period, the actual emission reductions in 2017 and 2018 are 59,296 tCO_2e and 24,726 tCO_2e, respectively.

During on-site interview and by checking the operation and maintenance records/15/, CCSC confirms the power plant has been operated smoothly, there is no equipment overhauled, retrofit/modification occurred during this monitoring period. The reason for the lower emission reductions in 2017 and 2018 is that the project is a waste energy recovery project for electricity generation. According to the interview with project owner and the record of glass production/16/, the waste heat production is determined by the glass production and the declined production of glass in this monitoring period caused the decrease of the waste heat production. CCSC considers that the fluctuation is acceptable and which is able to confirm that the emission reductions claimed during this monitoring \was reasonable.

4.8 Management system and quality assurance

The verification team has taken the following quality control measures within the verification team and of the verification process according to relevant CCSC's internal procedures:

- The application review of the verification was conducted and concluded that CCSC has the accredited scope and competence to verify the Project with impartiality as well;
- The verification team was selected with due considerations given in terms of the competence and impartiality;
- The verification team carried out the verification work and compiled a verification report strictly following CCSC's Procedures for Implementation of Verification.

The verification report submitted by the verification team was subjected to a technical review and decision-making process, the technical reviewers and decision-makers are qualified and independent from the verification team. If any issue is raised during technical review and/or decision-making the same is to be discussed between the issue-raiser and the team leader as well as the PP. All issues must be satisfactorily addressed before the submission of the report for final approval. The persons who conducted the technical review and decision-making for the Project are shown in the first page of this report and their Certificates of Competence can be found in Appendix A of this report.

The report approved by the authorized official of CCSC as the final report together with relevant documents is submitted to the client.

5. POST REGISTRATION CHANGES

5.1 Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline

As per the conclusion in section 4,3 and 4.4, there is no temporary deviation from registered monitoring plan or applied methodology.

5.2 Corrections

As per the conclusion in section 4.2, there is no correction for the Project.

5.3 Changes to the start date of the crediting period

There is no change to the start date of the crediting period.

5.4 Inclusion of a monitoring plan to a registered project activity

CCSC has checked the registered PDD to confirm there is no inclusion of a monitoring plan to the registered PDD that was not included at registration.

5.5 Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline

As per the conclusion in section 4.4, no permanent change from registered monitoring plan or monitoring methodology occurred in the Project.

5.6 Changes to the project design of a registered project activity

As per the conclusion in section 4.2, no permanent change from registered monitoring plan or monitoring methodology occurred in the Project.

5.7 Types of changes specific to afforestation and reforestation project activities

N/A

6. Clarification requests, corrective action requests and forward action requests

No.	CAR/CL/FAR	Response by Project Participants/ CCSC's conclusion of assessment
CL-1	Calibration information of the meter M091 shall be provided in the monitoring report.	Response by Project Participants: Calibration information of the meter M091 has been provided in the revised monitoring report. The verification team's conclusion of assessment: The calibration information of the meter M091 provided in the monitoring report has been checked and confirmed with the evidence.

		Therefore, this clarification has been closed by CCSC.

7. VERIFICATION AND CERTIFICATION STATEMENT

CCSC has carried out the 4th periodic verification of the Project "Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project" (GS ID: 750). This verification covers the period from 01/01/2017 to 31/05/2018 (first and last days included). In the course of the verification, no Corrective Action Request (CAR), no Forward Action Request (FAR), 1 Clarification Request (CL) was raised and closed out. The verification is based on the MR (Version 1.0), the revised MR dated 23/08/2018 (Version 03), the registered PDD and the registered validation report, the verification reports for the previous monitoring period, Emission Reductions Calculation Spreadsheet, and supporting documents available to CCSC.

As the result of the 4th periodic verification, CCSC confirms that:

- The project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- The monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of GHG Emission Reductions and in accordance with applicable Gold Standard Version 2.1 requirements, UNFCCC criteria, host country criteria;
- The actual monitoring systems and procedures are in place and functional，and comply with the monitoring systems and procedures described in the registered monitoring plan;
- The monitoring plan is in accordance with the applied methodology, i.e., ACM0012, Version 3.2;
- The installed equipment for measuring parameters required for calculating emission reductions are calibrated appropriately.
- The GHG emission reductions are calculated without material omission, errors and misstatements and in a conservative and appropriate manner.

CCSC hereby certifies that the Project has achieved GHG emission reductions as follows:

Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	84,022 tCO_2e

Authorized Signature:

Name: HUANG Shiyuan

Date: 29/08/2018

8. REFERENCE

Documents provided by the Project Participant and relevant background documents have been reviewed or referenced for the periodic verification conclusions.

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/26/ General drawing of the plant layout.

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APPENDIX A
CERTIFICATES OF COMPETENCE

Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 16/10/2017

Mr. Li Xingtong

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions* (CDMI0301) as

■ CDM validator for Technical Area(s): TA1.1/TA1.2/TA3.1/TA9.2/TA13.1

■ CDM verifier for Technical Area(s): TA1.1/TA1.2/TA3.1/TA9.2/TA13.1

☐ Technical expert for Technical Area(s):_____

Huang ShiYuan
CCSC General Manager

Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 16/10/2017

Mr. Zhou Wusen

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions* (CDMI0301) as

■ CDM validator for Technical Area(s): TA1.2

■ CDM verifier for Technical Area(s): TA1.2

☐ Technical expert for Technical Area(s):_____

Huang ShiYuan
CCSC General Manager

Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 16/10/2017

Ms. Zhang Ying

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions* (CDMI0301) as

■ CDM validator for Technical Area(s): TA1.2/TA13.1

■ CDM verifier for Technical Area(s): TA1.2/TA13.1

☐ Technical expert for Technical Area(s):_____

Huang ShiYuan
CCSC General Manager