



Periodic VERIFICATION REPORT

Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

GS Registration Reference GS 750

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Japan Consulting Institute

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Approved by Akio Yoshida, Executive Director	Organizational Unit JCI CDM Center Japan Consulting Institute (JCI)	
Client Swiss Carbon Asset Ltd.	Client ref., Mr. Renat Heuberger	
Project name	Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project	
Host Country PR China	Methodology Version ACM0012 Version 3.2	Sectoral Scope & technical Area SS 01 and 04; TA 1.2 and 4.5
Size Large Scale	ER 67,906 tCO ₂ e per year (average)	
GHG Reducing Measure/ Technology	Waste Heat Recovery for Power Generation	

A summary of the verification process and its conclusions

The periodic verification was conducted based on the desk review of GS Monitoring Reports of Versions 01 to 03 prepared by South Pole and relevant documentation.

The on-site assessment was conducted by JCI verification team at Yingxin glass manufacturing plant in Hebei province, the PR China from 16 through 18 April 2012.

The summary of results of the periodic verification is shown below and is detailed in the related sections of this Report.

1. Project implementation and monitoring

The project has been implemented in accordance with the registered GS-PDD and the Monitoring Plan. Four steam boilers and two turbine/generator units were installed as per the GS-PDD. Commissioning of the power generation facilities were started from 09/2009 and official monitoring of emission reductions started from 01/01/2010 as per the Monitoring Plan. GHG emission reductions are thus achieved by the Project activity.

2. Emission reductions

Total project emission reductions in year 2010 and 2011 were verified to be appropriate and correct for the period from 01/01/2010 through 31/12/2011, which are claimed in the Monitoring Report Version 03.


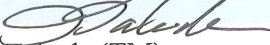
Year	Total Emission Reductions (tCO ₂ e)		
	Monitoring Report Ver. 1.0, 02/02/2012	Monitoring Report Ver. 3.0, 28/05/2012	Verified
2010	65,398	65,398	65,398
2011	41,185	41,185	41,185

3. CLs, CARs and FARs addressed at the first periodic verification of the Project activity.

Four (4) Clarification Requests (CLs), one (1) Corrective Action Request (CAR) and two (2) Forward Action Requests (FARs) were addressed during the verification. All the CARs and CLs were resolved appropriately by the project participant and closed out by the verification team, which are shown in Appendix A of the verification protocol.

In summary, it is JCI's opinion that Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project in the latest Monitoring Report meets all relevant UNFCCC requirements for the CDM, GS requirements and all relevant host country criteria. JCI thus requests the issuance of the CERs as a GS Project activity.

Date of revision 22 June 2012
Work verified by

Hideyuki Sato, Manager, Evaluation Group, JCI CDM Center	<input checked="" type="checkbox"/> No distribution without permission from the Client or responsible organizational unit
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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
ER	Emission Reduction
FAR	Forward Action Request
GHG	Green House Gas
GS	Gold Standard
JCI	Japan Consulting Institute
KP	Kyoto Protocol
MP	Monitoring Plan
MR	Monitoring Report
NA	Not Applicable
PDD	Project Design Document
QA	Quality Assurance
QC	Quality Control
SD	Sustainable Development
UNFCCC	United Nations Framework Convention for Climate Change

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Appendix A: Verification Protocol

I. VERIFICATION OPINION

Japan Consulting Institute (JCI) has performed the first periodic verification of the project “Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project” (hereinafter referred as the “Project”); with regard to the relevant requirements of GS project activity. This verification covers the period from 01/01/2010 through 31/12/2011. During the period the Project activity reduced GHG emissions by replacing part of electricity to be generated by the grid with generated power with use of the waste heat in the glass plant.

Swiss Carbon Asst Ltd. is responsible for the collection of the relevant monitoring data and the reporting of the GHG emission reductions from the Project activity in accordance with the Monitoring Plan.

It is JCI’s responsibility to express an independent verification statement on the reported GHG emission reductions from the Project activity for the period from 01/01/2010 through 31/12/2011.

JCI’s verification is based on the requirements as defined under the COP/MOP, Kyoto Protocol, Marrakech accord, as well as those defined by the CDM EB and in accordance with CDM Validation and Verification Manual Version 01.2. and GS rules.

The verification was performed based on the following documentation:

- Registered GS-PDD Version 2.0, dated 11/11/2010
- Gold Standard Validation Report Version 02, dated 21/07/2011
- Gold Standard Passport Version 2, dated 08/05/2011
- Approved consolidated baseline and monitoring methodology ACM 0012 “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects” Version 03.2
- Version02 of the “Tool to calculate the emission factor for an electricity system”
- Version05.2 of the “Tool for the Demonstration and Assessment of Additionality”
- Monitoring Report Version 1.0 dated 02/02/2012 and Version 3.0 dated 28/05/2012

The verification processes included:

- 1) Checking whether the Project activity was implementation as per the registered GS-PDD
- 2) Checking whether the monitoring instruments were all in place as per the monitoring methodology, relevant tools and the Monitoring Plan
- 3) Checking whether the monitoring has been implemented as per the monitoring methodology, relevant tools and the Monitoring Plan
- 4) Checking whether the data were collected and used for the calculations of emission reductions appropriately as per the Monitoring Plan and the methodology.
- 5) Checking whether the monitoring instruments were calibrated as per the monitoring methodology, the relevant tools and the Monitoring Plan
- 6) Collection of the evidence supporting the reported data and assumptions

JCI has verified that the information provided by the project participant is actual and representative of current operation of the Project activity; that it has been correctly derived from the registered GS-PDD; and that the emission reductions achieved have been correctly determined.

Based on the information reviewed and evaluated by JCI and the resolution of CARs and CLs, it is JCI’s opinion that 65,398 tons CO₂ for year 2010 and 41,185 tons CO₂ for year 2011 indicated in the latest Monitoring Report are correctly verified as ERs by the Project activity during the monitoring period.

II. INTRODUCTION OF GS VERIFICATION

Swiss Carbon Asset Ltd. has commissioned JCI to perform the periodic verification of the “Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project” in China. This

report summarizes the findings of the verification of the Project, performed on the basis of UNFCCC criteria for the CDM and GS rules, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

1. Objective of GS verification

The purpose of verification is to ensure that the Project activity complies with the requirements of paragraph 62 of the CDM modalities and procedures.

- (a) Ensure that the Project activity has been implemented and operated as per the registered GS-PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- (b) Ensure that the Monitoring Report and other supporting documents provided are complete and verifiable and in accordance with applicable CDM and GS requirements;
- (c) Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the Monitoring Plan and the approved methodology;
- (d) Evaluate the data recorded and stored as per the monitoring methodology during the monitoring period.

2. Verification approach

- 1) JCI shall assess and verify that the implementation of the Project activity and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the COP/MOP (CMP) and the CDM Executive Board.
- 2) This assessment shall involve a review of relevant documentation as well as on-site visits in accordance with paragraphs 59-62 of the CDM modalities and procedures. The information to be verified is described below.
- 3) The JCI's verification of the project documentation provided by the project participant shall be based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the Monitoring Report submitted to JCI. Qualitative information comprises information on internal management controls, calculation procedures, and procedures for the transfer of data, frequency of emissions reports, and review and internal audit of calculations.
- 4) In addition to the monitoring documentation provided by the project participants, JCI shall review:
 - (a) The registered GS-PDD, including the Monitoring Plan (before and after the revision) and the corresponding validation reports;
 - (b) The applied monitoring methodology;
 - (c) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;
 - (d) Any other information and references relevant to emission reductions from the Project activity (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).
 - (e) GS rules

3. Verification methods

3.1 Means of verification

JCI shall apply standard auditing techniques to assess the quality of the information, including but not limited to:

- 1) Desk review, involving:
 - a) A review of the data and information presented to verify their completeness;
 - b) 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, and the quality assurance and quality control procedures;
 - c) 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;
- 2) On-site assessment involving:
 - a) A review of information flows for generating, aggregating and reporting the monitoring parameters;

- b) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan in the GS-PDD;
- c) A cross-check of information and data provided in the Monitoring Report and data with other sources, such as plant log books, inventories, purchase records or similar data sources;
- d) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the GS-PDD and the selected methodology;
- e) A review of calculations and assumptions made in determining the GHG data and emission reductions;
- f) An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

3.2 Quality of evidence

- 1) When verifying the reported emission reductions, JCI shall ensure that there is a clear audit trail that contains the evidence and records that validate or invalidate the stated figures. It shall include the source documents that form the basis for assumptions and other information underlying the GHG data.
- 2) Matters to address when assessing the audit trail include:
 - (a) Whether sufficient evidence is available, both in terms of frequency (time period between evidence) and fully covering the claimed monitoring period;
 - (b) The source and nature of the evidence (external or internal, oral or documented, etc.);
 - (c) If comparable information is available from sources other than that used in the Monitoring Report, then JCI shall cross-check the Monitoring Report against the other sources to confirm that the stated figures are correct.
- 3) JCI shall assess that the data collection system meets the requirements of the Monitoring Plan as per the applied methodology.
- 4) JCI shall certify only emission reductions that are based upon verifiable evidence.

3.3 Clarification requests, corrective action requests and forward action requests

JCI, during its verification, shall identify issues related to the monitoring, implementation or operations of the proposed GS project activity that could impair the capacity of the proposed GS project activity to achieve emission reductions or influence the reporting of emission reductions. JCI shall identify, discuss and conclude these issues in the verification report.

JCI shall raise a CAR if one of the following occurs:

- (a) Non-conformities with the Monitoring Plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- (b) Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- (c) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants;

JCI shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

JCI shall raise a FAR during verification for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

All CARs and CLs raised by JCI during verification shall be resolved prior to submitting a request for issuance.

JCI shall report on all CARs, CLs and FARs in its verification report. This reporting shall be undertaken in a transparent manner that allows the reader to understand the nature of the issue raised the nature of the responses provided by the project participants, the means of verification of such responses and clear references to any resulting changes in the Monitoring Report or supporting annexes.

The verification protocol consists of two tables. The different columns in these tables are described as followings.

Verification protocol tables

Table 1: Requirement checklist

- ◇ **Checklist Question** :
The various requirements in Table 1 are linked to checklist requirements the project should meet. The checklist is organized in different sections.
- ◇ **Comment** :
The column is used to elaborate and discuss the checklist requirements and/or the conformance to the question.
- ◇ **CAR, CL, FAR** :
 - *Corrective Action Request (CAR) is used due to non-compliance with the checklist question.*
 - *Clarification Request (CL) is used when the verification team has identified a need for further clarification.*
 - *Forward Action Request (FAR) is used to highlight issues that require review during the next verification of the project activity.*

Table 2: Resolution of Corrective Action and Clarification Requests

- ◇ **Ref. to checklist question in Table1:**
Reference to the checklist question number in Table1 where the CAR, CL or FAR is explained.
- ◇ **Summary of project owner response :**
The responses given by the project participants during the communications with the verification team should be summarized in this section.
- ◇ **Verification conclusion :**
This section should summarize the verification team's responses and final conclusions.

4. Monitoring report making public

The project owner made the Monitoring Report of the Project activity/20/ publicly available on GS website on 01 June 2012.

III. VERIFICATION WORK

JCI carried out the verification work to ensure that the Project activity complies with the requirements of paragraph 37 of the CDM modalities and procedures

1. Verification team and technical reviewer

Details of the verification team members are shown below:

Table3. Details of the verification team members and the technical reviewer

Role	Name	Qualified Technical Areas (TA) related to the Project Activity
Team Leader	Masaki Okada	Energy industries (TA1.2) and Manufacturing industries (TA4.5)
Team Member	Toshiaki Takeda	Energy industries (TA1.2) and Manufacturing industries (TA4.5)
Technical Reviewer	Haruo Sawada	Energy industries (TA1.2) and Manufacturing industries (TA4.5)

Masaki Okada is the Team Leader of the GS Project activity. He has the working experience at a major engineering company in Japan nearly for 30 years before joining JCI. During the 30 years he was involved many overseas engineering projects mainly in the field of power generation, as a R&D engineer or the project manager. After joining JCI, he has handled many CDM/JI projects as the Team Leader or a Team Member for last several years.

Toshiaki Takeda is the Team Member of the GS project activity. He has the working experience at a major soft drink company in Japan for over 30 years before joining JCI. During the over 30 years he was

involved many plant construction and energy saving projects in both Japan and overseas, as an engineer or the project manager. After joining JCI, he has handled many CDM projects as the Team Leader or a Team Member for last 5 years.

Haruo Sawada is the Technical Reviewer of the GS project activity. He has the working experience at a major chemical company in Japan for over 30 years before joining JCI. During the over 30 years he was involved many engineering projects in both Japan and overseas, as a senior process engineer or project manager or officer. After joining JCI, he has handled many CDM projects as the Team Leader or a Team Member for last 4 years.

2. Quality control within the team of the verification process

The draft verification report underwent a technical review before being submitted to the project participants. The final verification report underwent another technical review before requesting the issuance of CERs of the Project activity. The technical review was performed by the technical reviewer qualified in accordance with JCI's qualification scheme for CDM validation and verification.

3. Desk review

The following table outlines the documentation reviewed during the verification. Through the desk review of the validation related documentation, it was confirmed that there are no FARs raised in the validation.

Table4. Document list

No.	Title
PDD/Report, Methodology, Tools, Guidance, Guidelines, and Manual	
/1/	Registered GS-PDD Version 2, dated 02/07/2009
/2/	Gold Standard Validation Report Version 02, dated 21/07/2011
/3/	Gold Standard Passport Version 2, dated 08/05/2011
/4/	Monitoring Reports Version 01 dated 02/02/2012(Published version)
/5/	Monitoring Reports Version 03 dated 28/05/2012 (Final version)
/6/	Approved consolidated baseline and monitoring methodology ACM 0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" Version 03.2
/7/	Version2, "Tool to calculate the emission factor for an electricity system"
/8/	Version05.2 of the "Tool for the Demonstration and Assessment of Additionality"
/9/	EB54 Annex 34: GUIDELINES FOR COMPLETEING THE MONITORING REPORT FORM (CMD-MR) Version 01
/10/	EB54 Annex 35: "Issuance completeness checklist" and "Issuance information and reporting checklist"
/11/	Clean Development Mechanism Validation and Verification Manual Version 01.2
/12/	EB52 Annex 60: GUIDELINES FOR ASSESSING COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS (Version 01)
/13/	Gold Standard Annexes to Toolkit
/14/	Gold Standard Toolkits
/15/	Gold Standard GS Project Cycle
/16/	Gold Standard Passport

No.	Title
References provided by the project participant	
/20/	Spreadsheet of emission reduction calculations
/21/	Explanation of the meter adjustment work by the grid company dated 03/03/2012
/22/	Monthly monitoring data files of the electricity (import and export with each meter reading) for year 2010
/23/	Monthly monitoring data files of the electricity (import and export with each meter reading) for year 2011
/24/	Daily monitoring records of electricity meter readings (2010-2011)
/25/	Electricity meter monitoring data flow-sheet
/26/	Employ satisfaction survey responses (10 samples)
/27/	Sale contract of the waste bricks from Line3 dated 20/08/2010
/28/	Glass Plant Manufacturing Records (2008-2011)
/29/	Meter replacement work instruction sheet dated 30/05/2010
/30/	Wastewater Analysis Report dated 13/11/2010
/31/	Flow Diagram of Glass Plant Wastewater Treatment System
/32/	General drawing of the plant layout
/33/	Electricity Meter Calibration Records
/34/	Power Plant Management Manual
/35/	Power Plant Troubleshooting Manual
/36/	Power Plant Safety Operation Manual
/37/	Training and examination records of attendees implemented on 18/06/2010 and 20/01/2011
/38/	Fire protection training record and examination record implemented for new employee on 01/06/2009
/39/	Qualification Certificate of Fire Protection System issued by Shahe city Fire Protection and Public Safety Bureau dated 01/06/2011
/40/	Employee Satisfaction Survey Answer Sheets (10 samples)
/41/	Wastewater Analysis Report dated 15/11/2010
/42/	Wastewater Analysis Report dated 10/11/2010
/43/	Sale slips of waste brick transaction with the supplier for the line 2

4. Follow-up actions (Interviews with relevant stakeholders in the host country)

The verification team visited the Project site on 16 and 17 April 2012 to verify that the Project is implemented, monitored and the data are reported as planned. During the visit, the verification team interviewed with relevant stakeholders listed in the below table with the topics discussed.

Table5. List of interviewees and topics

No.	Date	Name	Organization	Topics
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No.	Date	Name	Organization	Topics
/50/	16/04/2012	Mr. Zhang Zizai (Electric team leader), Mr. Chen Xubo (Boiler chief) Mr. Wang Leijie (Electric chief)	Yingxin glass manufacturing plant	<u>Interview with the Yingxin glass manufacturing plant chiefs</u> <ul style="list-style-type: none"> • Company profile • Glass plant outline • Plant utility system • Energy recovery system installed • Construction schedules • Reduction rate of electricity purchase amount from the grid after the project implementation
		Mr. Yang Xuan (Project Manager), Mr. Yi Lin (Head of Business Development), Mr. Justin Qin (Project Manager)	South Pole	
/51/	17/04/2012	Mr. Zhang Zizai (Electric team leader) Mr. Chen Xubo (Boiler chief) Mr. Wang Leijie (Electric chief)	Glass manufacturing plant	<u>Interview with the Yingxin glass manufacturing plant chiefs</u> <ul style="list-style-type: none"> • Electricity meter calibration records • Detailed daily electricity monitoring and recording procedures • Reduction of electricity purchase amount from the grid after the project implementation (contribution by the Project activity) • SD monitoring result reviews with relevant data and records
		Mr. Yang Xuan (Project Manager) Mr. Yi Lin (Head of Business Development) Mr. Justin Qin (Project Manager)	South Pole	
/52/	17/04/2012	Mr. Zhang Zizai (Electric team leader) Mr. Chen Xubo (Boiler chief) Mr. Wang Leijie (Electric chief) Ms. Bai Shu Rong (HR Manager) Ms. Li Chun Fang (Generator chief)	Glass manufacturing plant	<u>Interview with the Yingxin glass manufacturing plant HR manager and female staff</u> (HR manager) <ul style="list-style-type: none"> • Responsibilities of the manager • Conditions required to new candidate employees

No.	Date	Name	Organization	Topics
		Mr. Yang Xuan (Project Manager), Mr. Yi Lin (Head of Business Development), Mr. Justin Qin (Project Manager)	South Pole	<ul style="list-style-type: none"> • Restriction of working sections for female employees • Employment of new staffs/operators for the Project activity • Retired employees out of the new employees and their reasons (Female staff) • Reasons of application • Current job position • Salary and level of satisfaction • Training courses received to date
/53/	17/04/2012	Mr. Yang Xuan (Project Manager), Mr. Yi Lin (Head of Business Development), Mr. Justin Qin (Project Manager)	South Pole	<p><u>Interview with South Pole, the PDD author</u></p> <ul style="list-style-type: none"> • Initial findings of the GS-PDD were discussed about the following: <ul style="list-style-type: none"> ➤ Demonstration of the monitoring starting date ➤ Cross-check of the electricity amount with the readings of back-up meters ➤ Explanations about discontinuation of meter readings • Verification schedule

IV. VERIFICATION FINDINGS

The findings of the periodic verification and verification statements are summarized in the following sections. The verification criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the verification protocol in Appendix A.

The Monitoring Report Version 01 dated 02/02/2012 was made public on 01/06/2012 and the verification team visited the project site from 16 through 18 April 2012.

During the site visit, to assess the compliance of the Project activity with the registered GS-PDD and the Monitoring Plan, the verification team checked the status of the project site: the construction status and operating conditions of the power generation facilities, the monitoring system in place, the monitoring data recorded and the management system.

As described above, during the site visit, the team interviewed the Yingxin glass manufacturing plant manager, chiefs and staff. And project implementation status, monitoring instruments installation, emission reduction and monitoring sustainable development parameters were discussed.

As a result, a total of seven (7) findings were raised: one (1) CAR, five (4) CLs and two (2) FARs. All the CARs and CLs were resolved during the verification.

1. Project implementation in accordance with the registered GS-PDD

1.1 Project Implementation

According to the project owner, civil work of the Project activity started in October 2008, trial operation in August 2009 and as a result GS monitoring started from 01 January 2010. An official contract with the grid regarding power supply from the captive power generation plant of the project activity was made in February 2010.

Through the site visit, the verification team could visually confirm the following Project facility installations:

- Waste heat recovery piping systems and four steam boilers as per the GS-PDD. Consistencies of their models were visually confirmed with the name plates on the boilers.
- Steam piping systems and two turbine/generator units as per the GS-PDD. Consistencies of the models of the turbines and generators were visually confirmed with the name plates on the turbines and the generators.
- Monitoring system consisting of seven key watt-hour meters to monitor input and output electricity amount as per GS-PDD. Consistencies of their configurations were visually confirmed.

1.2 The starting date of monitoring

As addressed above, monitoring of the continuous operation of waste heat recovery and power generation facilities started from 01 January 2010. These were confirmed by the verification team during the site visit with the daily operation records and also the monitoring data records.

CL-1 was raised to clarify the monitoring start date in the Monitoring Report. Other relevant dates were described; however, the monitoring start date of the Project activity was not described in the report. The start date 01/01/2010 was demonstrated in the revised Monitoring Report, CL-1 was closed.

1.3 Power generation plant operation

Since the starting date of monitoring, the power generation plant has been operated smoothly according to the plant staff/51/, which was confirmed with the review of power generation records during the monitoring period. According to the manufacturing records of the glass plant, line2 was overhauled during the first half of year 2011 and line 3 the second half of year 2011, both resulted in the reduction of the amount of waste heat transferred from the furnaces and then power generation amount in the year accordingly. As indicated in the spreadsheet, the amount of power generation in year 2011 was smaller than the estimate in GS-PDD by 39%, while in year 2010 smaller only by around 4%.

2. Compliance of the Monitoring Plan with the Monitoring Methodology

The verification team confirmed through the verification process that the Monitoring Plan stipulated in the registered GS-PDD complies with the applied monitoring methodology ACM0012 version 3.2. Therefore, neither revisions of the Monitoring Plan nor deviations from the registered GS-PDD are required.

3. Compliance of monitoring with the Monitoring Plan

The compliance was verified on the below steps:

3.1 Compliance of the monitoring period

The verification team confirmed that the monitoring period is within the claimed fixed crediting period of the Project activity as compared below:

- The registered crediting period (fixed 10 years) : from 2010 through 2019
- The claimed monitoring period : from 01 January 2010 through 31 December 2011

3.2 Compliance of monitoring parameters

The conformance of monitoring of the parameters listed in the Monitoring Plan was reviewed and the results are summarized.

Table6. Assessment summary of monitoring parameters

Parameter	Monitoring Plan	Assessment Results
EG_y Net electricity output by the Project activity	Calculated $EG_y = EG_{export, y} - EG_{imported, y}$	OK. Calculated appropriately as the difference between parameter $EG_{export, y}$ and parameter $EG_{imported, y}$ in the calculations of the baseline emissions.
Q_{OE,y} Quantity of total electricity generation	Direct measurements by project participants through standard power meters. The electricity amount will be monitored continuously and recorded monthly.	OK. Continuously monitored with use of the two electricity meters (M050 and M040). Monitored data were aggregated monthly.
EG_{export, y} Electricity exported by the Project activity to the plant during year y in MWh which is used to calculate emission reduction	Direct measurements by project participants through standard power meters. The electricity amount will be monitored continuously and recorded monthly.	OK. Continuously monitored with use of the three electricity meters (M045, M081 and M091). Monitored data were aggregated monthly.
EG_{imported, y} Electricity imported by the project activity from the grid during year y in MWh which is used to calculate emission reduction	The electricity amount will be monitored continuously and recorded monthly.	OK. Continuously monitored with use of the two electricity meters (M081 and M091). Monitored data were aggregated monthly.

4. Assessment of data and calculations of GHG emission reductions

The Monitoring Report demonstrates the emission reduction calculations through the following 5 sections:

- 1) Baseline emissions (**BE_{Elec,y}**)
- 2) Project emissions (**PE_y**)
- 3) Leakage emissions (**LE_y**)
- 4) Emission reductions (**ER_y**)
- 5) Comparison of actual emission reductions with that estimated in the GS-PDD

The verification team verified the above calculations as below:

4.1 Baseline emissions calculation

For calculation of the baseline emissions the Monitoring Report uses the following equation defined in the registered GS-PDD.

(): Equation number in the GS-PDD

$$BE_{Elec,y} = f_{cap} \times EG_y \times EF_{grid,CM,y} \quad (B-14)$$

Where,

$BE_{Elec,y}$ Baseline emissions due to displacement of electricity during the year y in tons of CO₂
 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.
 f_{cap} for year 2010

$$Q_{OE, BL}/Q_{OE, 2010} = 86,400/81,270 = 1.06 > 1, \text{ therefore } f_{cap} \text{ for year 2010} = 1$$

f_{cap} for year 2011

$$Q_{OE, BL}/Q_{OE, 2011} = 86,400/51,155 = 1.69 > 1, \text{ therefore } f_{cap} \text{ for year 2011} = 1$$

EG_y Net electricity produced by the Project activity (MWh/y). The data for the two years are summarized below table.

$EF_{grid,CM,y}$ Combined margin CO₂ emissions factor in year y (tCO₂/MWh).
 $EF_{grid,CM,y} = 0.8935$ (tCO₂/MWh) is estimated ex-ante.

JCI has checked the reported data based on the monthly Monitoring Reports. The results are summarized as below and the consistency and correctness of the Monitoring Report data were confirmed.

Table7. Monthly Baseline Emissions (2010- 2011)

Year	Month ¹	Total Electricity Export (MWh) (A)	Total Electricity Import (MWh) (B)	Net Electricity Production (MWh) (C)=(A)-(B)	Baseline Emissions (ton CO ₂ e) (C)* f_{cap} * EF_{grid}
2010	January	4736.01	0	4736.01	4231.62
	February	6676.39	0	6676.39	5965.45
	March	5827.84	0	5827.84	5207.17
	April	5652.93	0	5652.93	5050.90
	May	5870.78	0	5870.78	5245.54
	June	6051.02	0	6051.02	5406.59
	July	5793.92	0	5793.92	5176.87
	August	6436.54	0	6436.54	5751.05
	September	6360.00	0	6360.00	5682.66
	October	6522.58	0	6522.58	5827.93
	November	6887.62	0	6887.62	6154.09
	December	6377.98	0	6377.98	5698.73
	Total		73193.61	0	73193.61
2011	January	5338.34	0	5338.34	4769.81
	February	5003.46	109.13	4894.33	4373.08
	March	2357.40	127.26	2230.14	1992.63
	April	3503.86	0	3503.86	3130.70
	May	3327.50	137.71	3189.79	2850.08
	June	3450.80	204.95	3245.85	2900.17
	July	3067.94	0	3067.94	2741.20

¹ Except January 2010, the data of all the months are from 26 of previous month through 25 of the month. The data of January 2010 are from 1 January through 25 January.

August	3348.96	0	3348.96	2992.30
September	5079.32	0	5079.32	4538.37
October	4854.50	0	4854.50	4337.50
November	4486.42	0	4486.42	4008.62
December	2855.40	0	2855.40	2551.30
Total	46673.90	579.05	46094.85	41185.75

The verification team has confirmed following subjects regarding the electricity data monitoring results shown in the spreadsheet /17/ provided by the project owner:

- 1) Each monthly summary data include the amount of electricity monitored from 26th of the previous month through 25th of the month, except the data of January 2010 which covers from 1st through 25th January, as from the 1st January the monitoring period started. As indicated in the accumulated meter reading values of “Start date on 01/01/2010” in the spreadsheet, the verification team confirmed with the daily monitoring records that the monthly monitoring data of January 2010 started correctly from the 1st January 2010.
- 2) The verification team confirmed that the discontinuation of accumulated meter readings in the spreadsheet were due to zero reset of the meter reading after adjustment work by Shahe Power Supply Company Metering Institute conducted four times in 2011 on the electricity meters M040 and M050; and the replacement of Meter 045 with new one implemented in 2010 to increase multiplication factor of easier readings. These were confirmed with the explanation document of the adjustment work submitted by the Institute dated 03/03/2012 /22/ and the meter replacement instruction issued on 30/05/2010 /30/.
- 3) The verification team raised CL-4 since the cross check of the monitored data was not implemented as per the Monitoring Plan. According to the Monitoring Plan, the monitored data with the meters M045, M081 and M091 located at the glass plant side were stipulated to be cross checked with the monitored data with the meters M040 and M050 located at the power plant side. As demonstrated in the table of the revised Monitoring Report, the two kinds of the data were compared for cross checking. The table indicates the monitored electricity data with the meters located at the power plant side show slightly higher values than those monitored with the meters located at the glass plant side, of which gap is calculated to be 0.22% in the revised Monitoring Report. When considering potential transfer line loss between the two locations, the small gap is considered reasonable and normal. Hence CL-4 was closed.
- 4) As described above **1.3 power generation plant operation**, for overhaul the operation of line 2 was stopped from January through June and line 3 from June through December in year 2011. As a result of these line stoppages, the amount of glass manufacturing was decreased, which resulted in reduction of the amount of power generation in year 2011. Compared with in year 2010, the amount of power generation in year 2011 decreased by 37%.
- 5) Further to confirm actual contribution by the Project activity in reducing electricity import from the grid company, the parameter of electricity yield (electricity consumption per manufactured glass amount, MWh/ton-glass) was compared between before and after project implementation.

As shown below table the overall yield before and after the project implementation remained almost the same, which is considered to have suggested the correctness of the monitored electricity data.

Table8. Comparison of the electricity yield between before and after the project implementation

Period	Amount of glass manufactured (ton-glass)	Amount of electricity supplied by the grid (MWh)	Amount of net electricity supplied by the Project activity (MWh)	Total amount of electricity (MWh)	Electricity yield (MWh/ton-glass)

Before project implementation ²	558,185	78,719	0	78,719	0.141027
After project implementation ³	1,150,129	42,771	119,288	162,059	0.140905

4.2 Project emissions (PE_y)

The project emissions are not accounted for as defined to be zero in the GS-PDD as per the applied methodology ACM0012.

4.3 Leakage emissions (LE_y)

The leakage emissions are not accounted for as defined to be zero in the GS-PDD as per the applied methodology ACM0012.

4.4 Emission reductions (ER_y)

The Monitoring Report uses the following equation defined in the registered GS-PDD.

() : Equation number in the GS-PDD

$$ER_y = BE_y - PE_y \quad (8)$$

The verification team confirmed with the spreadsheet that the emission reductions are correctly calculated and the summary by month is tabulated in Table 3 in the Monitoring Report. Annual emission reductions are tabulated below:

Table9. Annual emission reductions summary (tCO₂e)

Year	Baseline emissions	Project emissions	Emission reductions
2010	65,398	0	65,398
2011	41,185	0	41,185

In conclusion, the verification team has verified that the emission reductions were appropriately and correctly calculated to be 65,398 tCO₂e for year 2010 and 41,185 for year 2011 complying with the Monitoring Plan, the relevant tools and the applied methodology.

5. Comparison of actual emission reductions with that estimated in the GS-PDD

As demonstrated in section E.5. of the Monitoring Report, the total estimated emission reductions based on the registered GS-PDD during the monitoring period are 135,812 tCO₂, while the total actually achieved emission reductions are 106,583 tCO₂, equivalent to 78 % of the estimated emission reductions. This gap is attributed mostly to the reduction of glass manufacturing amount due to the overhauls of line 2 and 3 in year 2011. For the overhauls the two lines were stopped for approx. a half years in turn.

6. Quality of evidence to determine emission reductions

Through the verification processes, the verification team has used the following relevant and reliable evidence for the verification of the emission reductions:

- 1) Spreadsheet of emission reduction calculations (January 2010 – December 2011) /20/
- 2) Electricity Meter Calibration Records /34/
- 3) Monthly monitoring data files of the electricity (import and export with each meter reading) for year 2010 /25/
- 4) Monthly monitoring data files of the electricity (import and export with each meter reading) for year 2011 /26/
- 5) Glass Plant Manufacturing Records (2008-2011)/28/

² Data sampling: August 2008-July 2009. Data after August 2009 were excluded as commissioning of the Project activity started.

³ Data sampling : January 2010 – December 2011

The verification team confirmed that the monitoring data provided by the project owner fully cover the monitoring period and were recorded appropriately and correctly complying with the Monitoring Plan, and are consistent with data stated in the Monitoring Report.

All the measured electricity data were obtained from the electricity meters appropriately calibrated and operated in accordance with the Monitoring Plan.

The verification team assessed that above arguments support the quality of the evidence.

7. Management system and quality assurance

7.1 Monitoring organization

The verification team confirmed that the monitoring task has been implemented under an appropriate monitoring organization established referring to the organization chart illustrated in GS-PDD.

As detailed in **6.5 Quality assurance**, the monitored data by shift staff have been checked appropriately first by the team leader and then by the power plant manager. The monthly summary report have been also checked by the plant manager appropriately, which was confirmed through the interview with the plant chief /51/.

Through the site visit, the verification team confirmed that the monitoring organization has been functioning well to monitor the Project activity and achieve planned emission reductions as per the Monitoring Plan.

7.2 Training

The verification team confirmed with the interview with a newly hired employee/52/ that the glass plant provided a series of training programs to new employees as well as existing employees regarding not only plant operation but also operation safety, part of which was also confirmed with relevant records/37/,/38/.

In summary the verification team confirmed that training to the plant staff has been provided sufficiently.

7.3 Manual preparation

The verification team confirmed that the glass plant prepared the following three manuals for the power r plant operation:

- 1) Power Plant Management Manual /35/
- 2) Power Plant Troubleshooting Manual /36/
- 3) Power Plant Safety Operation Manual /37/

It was confirmed through the site visit that the management system of the glass plant has been well functioning in implementing the monitoring tasks in accordance with the Monitoring Plan.

7.4 Calibration of monitoring instruments

During the site visit, all the calibration records/34/ were reviewed and confirmed that the calibration had been conducted every year for all the electricity meters appropriately as per the Monitoring Plan, the monitoring methodology and the relevant tool. Though the calibration certificates are valid for 5 years all the meters were calibrated every year to comply with Chinese code DL/T448-2000.

As seen below, the electricity meter 045 was replaced in May 2010 with a new one with higher multiplication factor for easier recording of the meter reading.

The verification team raised CAR-1 to request revision of the calibration date of meter M045 to maintain the consistency with the description in the table. As the date was corrected appropriately, CAR-1 was closed. Assessment results of their conformance on validity are summarized in the below table.

Table9. Calibration Record Summary

Parameter	Tag No	Serial No.	Accuracy	Calibration date	Valid until	Validity assessment
Q _{OE,y}	050	500006	0.2	11/10/09	10/10/14	OK
				13/10/10	12/10/15	OK
				16/10/11	15/10/16	OK
Q _{OE,y}	040	500004	0.2	11/10/09	10/10/14	OK

				13/10/10	12/10/15	OK
				16/10/11	15/10/16	OK
EG _{export, y} EG _{import, y}	051	500001	0.2	11/10/09	10/10/14	OK
				13/10/10	12/10/15	OK
				16/10/11	15/10/16	OK
EG _{export, y} EG _{import, y}	041	500005	0.2	11/10/09	10/10/14	OK
				13/10/10	12/10/15	OK
				16/10/11	15/10/16	OK
EG _{export, y}	045	055007	0.5	11/10/09	10/10/14	OK
		550476 ⁴	0.5	26/05/10	25/05/15	OK
				16/09/10	15/09/15	OK
				13/09/11	12/09/16	OK
EG _{export, y} EG _{import, y}	081	006513	0.5	11/10/09	10/10/14	OK
				13/10/10	12/10/15	OK
				16/10/11	15/10/16	OK
EG _{export, y} EG _{import, y}	091	006513	0.5	11/10/09	10/10/14	OK
				13/10/10	12/10/15	OK
				16/10/11	15/10/16	OK

The verification team raised FAR-1 to keep in a file all the meter maintenance records and documents relevant meter calibration for preparations for next verification.

7.5 Quality assurance

During the site visit the verification team confirmed that the QA processes for the monitoring data handling has been implemented appropriately as below steps:

- 1) The electricity meters have been read by both the glass plant and the power generation plant separately as below timing.

Table10. Timing of electricity meter readings by plant

Plant	Monitored meters	7:50 am	3:50 pm	11:50 pm
Glass plant	M081, M091	-	-	Yes
Power generation plant	M040, M045, M050, M41, M45	Yes	Yes	Yes

- 2) The power generation plant obtains the meter readings of M081 and M091 from the glass plant over the phone.
- 3) Next day the team leader of the power generation plant analyzes all the daily monitored data
- 4) The power generation plant manager also confirms the daily Monitoring Report
- 5) The power generation plant manager confirms the monthly Monitoring Report

Regarding the daily cross check of the monitored data of the power generation plant with the data of the glass plant, the verification team raised FAR-2 to prepare appropriate guidelines of the allowable gap between the two kinds of monitored data so that the monitoring staff can easily identify abnormality of meter reading results.

8. Sustainable Indicator Monitoring

The GS-PDD specifies the ten (10) sustainable indicators as monitoring parameters, which were verified by the verification team as below:

8.1 Air Quality during construction period

As the mitigation measures, the construction of 2-m height fences around the construction site, water spraying and provision of mask to workers were planned and taking their photos were also included. Though their implementation was confirmed through the interview with the plant staff /51/, no photos

⁴ The meter was replaced in May 2010

were taken during construction period. The provision of mask to construction worker, however, was checked with the plant' mask application guidelines.

As an alternative, TSP (total suspended particle) analysis result around the plant site was checked. The analysis was implemented two times by a qualified environmental monitoring center during the construction period as shown in Annex 2 of the Monitoring Report. The data monitored on both 08/04/2009 and 12/06/2009 showed the results were below the allowable limit.

Though there were no photos to directly indicate the mitigation measures taken as per the Monitoring Plan, the monitored data on TSP suggested the air quality was maintained within the allowable limit during the construction period. In fact the project site is located behind the glass production lines within the glass plant and far away from the office area of the plant, and the plant site itself is far away from the neighboring residential area. Potential influence by the construction work, therefore, was assessed to be limited.

As argued above the verification team concludes the indicator was satisfied.

8.2 Air Quality during operating period

As per the Monitoring Plan, SO₂ and dust concentrate in the air were measured by the certified monitoring center 4 times per year in year 2010 and year 2011. As shown in Annex-3 of the Monitoring Reports, all the results indicate the data of the two parameters were below the allowable limit and also lower than those measured before project implementation.

Hence the verification team concludes the indicator was satisfied

8.3 Quality of employment

The Monitoring Plan of the indicator includes the three monitoring parameters, which were verified below against the future target specified:

- 1) 24 (job positions created solely by the PA)

The verification team confirmed with the employment records of HR group as indicated in Annex 4 of the Monitoring Report that the glass plant employed 24 new employees for operation of the proposed project facilities (waste heater boilers and turbine/generators). This was cross checked with the interview with the HR manager and a newly employed female staff/52/.

- 2) The workplace air quality follows national standard (GBJ16-87 and GBZ1-2002)

As per the national standard the air quality at four areas were measured by the certified monitoring center in year 2010 and 2011, of which results, as shown in Annex 4, satisfied the targeted national standard: benzene, sulfur trioxide and hydrogen-fluoride or other toxic gas were not detected according the two analysis reports.

- 3) The fire protection equipments are in place; the employees receive fire protection training.

The verification team visually confirmed that the fire protection system was in place in the boiler rooms and the power generation rooms appropriately. Further the team could cross checked the conformity with the certificate of qualification of the plant's fire protection system issued by the relevant city bureau/39/ which is demonstrated in Annex 4 of GS-PDD.

The verification team also confirmed the training of the employees regarding the fire protection system and the examination applied to the attendees with their records/38/.

8.4 Human and institutional capacity

The verification team confirmed with the HR record in Annex 4 and the interview with the HR manager and the female employee during the site visit/52/ that the glass plant newly employed six female. Out of the newly employed 24 staffs, 4 staffs are female who were employed under the same salary conditions as male staff. This clearly satisfies the future target equals to or more than one (1) staff.

Training of fire protection to the female new employees was confirmed with the record in Annex 4 and also with another training record /38/ as well. Through the interview with the new female employee/52/ the verification team confirmed a series of training was provided to new employees (female and male) regarding the glass plant management and operation, safety and specialty.

8.5 Quantitative employment and income generation

The verification team confirmed that the glass plant employed new 24 staffs for the operation of the power generation system as already argued above and that they were satisfied with the employment conditions provided by the glass plant, evidenced with their answer sheets to the employee satisfaction survey implemented in year 2011/40/. Further this was confirmed through the interview with the new female employee during the site visit. In the interview the employee expressed that the salary base for female employees is the same as that for male employees and they have received bonus every year end and as a result the salary level of the plant is high in the region.

8.6 Install noise reduction equipment and protection measures for personnel

The verification team confirmed that the operating room of the power plant was separated from the turbines and generators room for air conditioning and noise protection. The turbines and generators are covered for noise protection and safety.

The boilers are installed inside a boiler house, where usually no operators are stationed and their operating conditions are monitored remotely.

Further the verification team confirmed that as shown in Annex 5 the noise measurement analysis results conducted in year 2010 and 2011, two times each, revealed the noise around the site day and night was below the allowable limit.

8.7 Water quality

The verification team received a flow-diagram of the wastewater treatment plant /32/ and water quality analysis reports and confirmed that the wastewater from the power plant 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.

The wastewater quality analysis reports issued on 15 November 2010/41/ and on 10 November 2011/42/ showed the quality of discharged wastewater satisfied the specified standard as shown in Annex 6.

CL-2 was raised to request wastewater analysis reports to demonstrate the conformance as per the Monitoring Plan. With the wired-diagram of the wastewater treatment system, the analysis reports were provided, CL-2 was closed.

8.8 Air quality of whole glass plant area after the PA

The verification team confirmed with the air analysis reports shown in annex 6 indicated the air quality of whole glass plant area satisfied the relevant standards. The measurement results in year 2010 and 2011 the concentrate of SO₂ and dust were below the standards.

8.9 Safe and healthy work environment for workers of the whole plant

Through the desk reviews of training records/37/, /38/ and the interview with the employee/51/, the verification team confirmed that the Safe and healthy work environment for workers of the whole plant has been achieved. The team also confirmed the achievement with the certificate of conformance of the safe and healthy working environment issued by the relevant institute valid from 27/05/2009 through 26/05/2012 as shown in Annex 6.

8.10 Furnace waste refractory brick disposal

The verification team confirmed that the waste refractory brick from line 2 and 3 were sold to the brick supplier.

According to the glass plant manufacturing records /28/, the line 2 was overhauled from December 2010 through June 2011 and the line 3 from June through December 2011. During the overhauls, the furnaces of the two lines were rebuilt with new bricks; therefore, many waste bricks were sold to the brick supplier for their recycling use.

The sale of the waste refractory brick to the supplier was confirmed with the sale contract of the line 3/27/ and the transaction record slips relevant the brick sales/43/ in case of the line 3.

During the site visit, CL-3 was raised to request provision of evidence to demonstrate the sale of the brick from the line 2. As appropriate evidence, some sales slips were provided and confirmed appropriate, CL-3 was closed.

In summary the verification team can concludes that the Project activity satisfied the above SD indicators and hence contributes to sustainable developments in the region.



APPENDIX A GS VERIFICATION PROTOCOL –Version 01

1. INTRODUCTION

This document is prepared as the Verification Protocol on Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project.

The verification protocol is prepared for the following purposes:

- To ensure that, in accordance with the GS requirements, the CDM requirements and the Validation Verification Manual version 01.2 (Annex 01, CDM EB-55, "VVM"), these rules are complied with for any project activities requesting issuance request as a GS project activity.
- To ensure a thorough, independent assessment of proposed project activities submitted for registration as a proposed GS project activity against the applicable GS requirements.
- To assess whether the monitoring report of the proposed GS project activity meets the GS requirements, using objective evidence, and to assess the completeness and accuracy of the claims and conservativeness of the assumptions made in the monitoring report.

The verification protocol consists of the following two types of tables, which are effective for the purposes of verification above.

Table 1 contains the checklist with questions along with the thematic chapter of VVM and the GS rules.

Table 2 shows the corrective actions or clarifications which are requested to be taken in Table 1 and the response from the PP.

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Table 1 Requirements Checklist.....Page -1-1

Table 2 Resolution of Corrective Actions and Clarification Requests..... page -2-1

2. CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS AND FORWARD ACTION REQUESTS

If, during its verification, issues are identified related to the monitoring, implementation or operations of the proposed GS project activity that could impair the capacity of the proposed GS project activity to achieve emission reductions or influence the reporting of emission reductions. These issues are identified, discussed and concluded in the verification report.

- **CAR** : a corrective action request (**CAR**) is raised, if one of the following occurs:
 - (a) Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
 - (b) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions;
 - (c) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.
- **CL** : a clarification request (**CL**) is raised, if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.
- **FAR** : a forward action request (**FAR**) is raised, if the monitoring and reporting require attention and/or adjustment for the next verification period.

The CARs and CLs are resolved or "closed out" only if the project participants modify the monitoring report or provide adequate additional explanations or evidences that satisfy the requirements. If this is not done, the project activity will not be recommended for emission reductions request to the GS.

All CARs, CLs and FARs will be reported in its verification report. This reporting shall be undertaken in a transparent and unambiguous manner that allows the reader to understand the nature of the issues raised, the nature of the responses provided by the project participants, the means of verification of such responses and clear reference to any resulting changes in the monitoring report or supporting annexes.

GS-CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

TABLE 1 REQUIREMENTS CHECKLIST (OK/NO/NA/Tbv)

Sec. in VVM	Requirement	Refer. Para. VVM	Check Comment	CAR, CL FAR
1.	Project Implementation in accordance with the Registered GS-PDD	Para. 195-198 VVM	--	--
	<Requirement to be verified> The DOE shall identify any concerns related to the conformity of the actual project activity and its operation with the registered project design document.	Para. 195 VVM	--	--
1.1	Are all physical features of the proposed GS project activity proposed in the registered GS-PDD in place? Has the project participants operated the proposed GS project activity as per the registered GS-PDD?	Para. 196 VVM	OK. Construction work had been entirely completed in accordance with the registered GS-PDD: 4 steam boilers and 2 turbine/generator units were installed as per the GS-PDD.	
1.2	Does the implementation or operation of GS project activity conform to the description contained in the registered GS-PDD?	Para. 197 VVM	OK, as shown in the above item 1.1	
1.3	DOE shall conduct an assessment on the potential impacts due to these changes in project implementation.	Para. 197 VVM	OK. JCI confirmed through desk review and the site visit that there were no changes of the project implementation from the registered GS-PDD.	
1.4	Does the monitoring report contain the implementation status of the project during the monitoring period under consideration	EB48 Annex68	Not OK. There is no description about the GS monitoring start date.	CL-1
2.	Compliance of the Monitoring Plan with the Monitoring Methodology (CDM section)	Para. 199-203 VVM	--	--
	<Requirement to be verified> The monitoring plan of the proposed GS project activity shall be in accordance with the applied methodology.	Para. 199 VVM	--	--
2.1	Is the validated monitoring plan in accordance with the approved methodology applied by the proposed GS project activity?	Para. 200 VVM	OK. Through the desk review, it was confirmed that the validated monitoring plan is in accordance with the approved methodology.	
2.2	If during verification, the DOE concludes that the monitoring plan is not in accordance with the monitoring methodology, the DOE shall request a revision to the monitoring plan prior to concluding its verification and making its certification decision. The DOE may request for revision of the monitoring plan covering the monitoring period under verification, for approval by the GS Executive Board.	Para. 201 VVM	OK. As above, JCI has confirmed that the monitoring plan is in conformance with the applied methodology.	



GS-CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

TABLE 1 REQUIREMENTS CHECKLIST (OK/NO/NA/Tbv)

Sec. in VVM	Requirement	Refer. Para. VVM	Check Comment	CAR, CL FAR
2.3	For monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency), the DOE is encouraged to bring to the attention of the GS Executive Board issues which may contribute in enhancing the level of accuracy and completeness of the monitoring plan.	Para. 202 VVM	NA	
2.4	Does the monitoring report contain reference to any deviation request approved by the Executive Board for the monitoring period in consideration?	EB48 Annex68	No deviations referred to the monitoring report.	
3.	Compliance of Monitoring with Monitoring Plan (CDM section)	Para. 204-206 VVM	--	--
	<Requirement to be validated> Monitoring of reductions in GHG emissions to result from the proposed GS project activity shall be implemented in accordance with the monitoring plan contained in the registered GS-PDD or the accepted revised monitoring plan.	Para. 204 VVM	--	--
3.1	Has the monitoring plan and the applied methodology been properly implemented and followed by the project participants?	Para. 205 VVM	OK. Monitoring has been implemented complying with the monitoring plan	
3.2	Whether all parameters stated in the monitoring plan, the applied methodology and relevant GS rules have been sufficiently monitored and updated as applicable or not, including:	Para. 205 VVM		
(a)	Project emission parameters;	Para. 205 VVM	Not required as Project emission is excluded as per the methodology	
(b)	Baseline emission parameters;	Para. 205 VVM	OK. All the baseline emission parameters were monitored appropriately as per the monitoring plan	
(c)	Leakage parameters;	Para. 205 VVM	Not required as Leakage emission is excluded as per the methodology	
(d)	Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan.	Para. 205 VVM	OK. JCI confirmed that the management and the operation have been implemented appropriately as per the GS-PDD.	
(e)	Does the monitoring report contain monitoring systems and procedures?	EB48 Annex68	OK. JCI confirmed the monitoring report contains the monitoring system and procedures as described in SECTION. C. of the MR.	

GS-CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

TABLE 1 REQUIREMENTS CHECKLIST

(OK/NO/NA/Tbv)

Sec. in VVM	Requirement	Refer. Para. VVM	Check Comment	CAR, CL FAR
3.3	Is the accuracy of equipment used for monitoring in accordance with the relevant guidance provided by the CDM Executive Board and controlled and calibrated in accordance with the monitoring plan?	Para. 205 VVM	OK. JCI confirmed that the project activity has installed monitoring equipment which satisfies CDM EB requirements and its calibration has been implemented as per the monitoring plan appropriately.	
(a)	Are monitoring results consistently recorded as per approved frequency?	Para. 205 VVM	OK. JCI confirmed that the monitored data have been properly recorded as per the approved frequency stipulated in the monitoring plan.	
(b)	Have quality assurance and quality control procedures been applied in accordance with the monitoring plan?	Para. 205 VVM	OK. JCI confirmed that QA/QC procedures have been implemented by the management of the company as per the monitoring plan. Regarding the cross check of electricity meter reading results, there was no guidelines of the allowable gap between the two kinds of monitored data.	FAR-2
(c)	Does the monitoring report contain any quality assurance and quality control system employed by the project activity?	EB48 Annex68	OK. JCI confirmed the monitoring report contained QA/QC system employed by the project activity.	
(d)	Does the monitoring report contain all parameters required to be monitored and reported at the intervals required by the monitoring plan and the applied methodology?	EB48 Annex68	OK. The four parameters relevant to electricity amount were monitored as per the monitoring plan.	
(e)	Does the monitoring report contain information on calibration of monitoring instruments as specified by the monitoring methodology and the monitoring plan?	EB48 Annex68	Not OK. JCI confirmed that necessary information on calibration of monitoring instruments is addressed appropriately in the monitoring report. However it was found that descriptions of the calibration dates of the meter 045 were not consistent with that specified in the table. Further it was recommended as a FAR to keep in a file all the documents, such as certificates or records regarding the meter calibration and	CAR-1 FAR-1

GS-CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

TABLE 1 REQUIREMENTS CHECKLIST (OK/NO/NA/Tbv)

Sec. in VVM	Requirement	Refer. Para. VVM	Check Comment	CAR, CL FAR
			maintenance.	
(f)	Does the monitoring report contain emission factors, IPCC default values, and other reference values used in the calculation of emission reductions?	EB48 Annex68	OK. JCI confirmed that the MR contains the grid emission factor calculated ex-ante in the GS-PDD.	
(g)	Detailed calibrations of instruments including number of meters, meter location, and calibration dates should be provided and the calibration frequency should be in accordance with the methodology and the monitoring plan?	EB48 Annex68	OK. JCI confirmed that detailed calibration records have been demonstrated appropriately in the MR.	
4.	Assessment of Data and Calculation of GHG Emission Reductions	Para. 207-209 VVM	--	--
	<Requirement to be validated> GHG emission reductions achieved by/resulting from the proposed GS project activity shall be calculated applying the selected methodology.	Para. 207 VVM	--	--
4.1	Is a complete set of data for the specified monitoring period available?	Para. 208 VVM	OK. All the necessary data for the monitoring period were provided.	
(a)	If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the DOE shall opt to either make the most conservative assumption theoretically possible in finalizing the verification report, or raise a request for deviation prior to submitting request for issuance, if appropriate;	Para. 208 VVM	NA	
(b)	Information provided in the monitoring report has been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis	Para. 208 VVM	Not OK. Cross checks of the parameter EG _y with other generation plant meters were not implemented.	CL-4
(c)	Has calculations of baseline emissions, proposed GS project activity emissions and leakage, as appropriate, been carried out in accordance with the formula and methods described in the monitoring plan and the applied methodology document?	Para. 208 VVM	OK. JCI confirmed that the calculations of the baseline emissions have been conducted as per the formula and methods described in the monitoring plan and the applied methodology document. No calculations are required for project and leakage emissions as assumed to be zero as per the methodology.	
(d)	Have any assumptions used in emission calculations been appropriate?	Para. 208 VVM	OK. JCI has confirmed the assumptions used are appropriate.	
(e)	Has appropriate emission factors, IPCC default values and other reference values been correctly applied?	Para. 208 VVM	OK. JCI confirmed that they are not required for the calculations as only the grid emission factor determined ex-ante,	



GS-CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

TABLE 1 REQUIREMENTS CHECKLIST

(OK/NO/NA/Tbv)

Sec. in VVM	Requirement	Refer. Para. VVM	Check Comment	CAR, CL FAR
			and monitored electricity amount were required.	
(f)	Does the monitoring report contain a comparison of the actual CERs claimed in the monitoring period with the estimate in the GS-PDD, and explanation on any significant increase?	EB48 Annex68	OK. JCI confirmed that the comparison table is demonstrated in section E.5. of the monitoring report.	
(g)	Does the spreadsheet contain the values of the monitored parameters?	EB48 Annex68	OK. JCI confirmed that the sheet contains the values of the monitored parameters.	
(h)	Does the spreadsheet contain the formulae of calculation that are shown in the spreadsheet cells whenever possible?	EB48 Annex68	OK. The spreadsheet contains the formulae.	
(i)	Does the spreadsheet contain any other explanation with regard to application of formulae in the spreadsheet?	EB48 Annex68	OK. Formulae used for the calculations are explained in a separate spreadsheet.	
5.	Compliance of Sustainability Monitoring with Monitoring Plan (GS section)		--	--
	<Requirement to be validated> Monitoring of sustainability indicators shall be implemented in accordance with the monitoring plan contained in the registered GS-GS-PDD.			
5.1	Does the monitoring report contain all parameters required for monitoring sustainability of the project activity specified in the monitoring plan		OK. All the ten parameters were monitored and their results are reported in the monitoring report.	
	Assessment results of each parameter monitored			
5.2	Air quality during construction period		OK. No photos and relevant documents were recorded; however, an analysis report on air quality during the construction period with satisfactory results was confirmed, as an alternative measure.	
5.3	Air quality during operation period		OK. Analysis reports on air quality during the operation period with satisfactory results was confirmed	
5.4	Quality of employment		OK. Employment records and an inspection report by the local government were confirmed. Also training records for new	

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TABLE 1 REQUIREMENTS CHECKLIST (OK/NO/NA/Tbv)

Sec. in VVM	Requirement	Refer. Para. VVM	Check Comment	CAR, CL FAR
			employees were confirmed.	
5.5	Human and institutional capacity		OK. Employment of female employees confirmed with relevant documents and also with the representative female employee the interview during the site visit.	
5.6	Quantitative employment and income generation		OK. Confirmed with HR data and interview records.	
5.7	Noise		OK. Confirmed with an analysis report on noise with satisfactory results.	
5.8	Water quality		Not OK. Confirmed that only domestic wastewater treatment is required and it has been treated by a lagoon system before discharging. It, however, is request to provide water quality analysis reports to demonstrate conformance with relevant regulations on treated water quality.	CL-2
5.9	Air quality of whole glass plant area after the PA		OK. It was confirmed that an air quality analysis report demonstrated the satisfactory result.	
5.10	Safe and healthy work environment for workers of the whole plant		OK. The conformance of the environment was confirmed with many documents/records relevant to work environment.	
5.11	Furnace waste refractory brick disposal		Not OK. There were two overhauls conducted during the monitoring period for line 2 and 3. Though there is the sale contract of the waste brick of line 3; however, there was no certificate to demonstrate proper treatment of the waste brick of line 2.	CL-3



CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

Table 2. Resolution of Corrective Actions and Clarification Requests

No. CAR, CL	Clarifications and corrective action requests by verification team	Sec. No. in Table 1	Summary of project owner response	Verification team Conclusion
CAR Corrective Action Requests				
CAR-1	<u>Revision of the description of meter calibration date</u> it was found that descriptions of the calibration dates of the meter 045 were not consistent with that specified in the table.	3.3	The descriptions of meter calibration dates have been corrected.	OK. The calibration date was corrected appropriately and consistently with the table content. CAR-1 was closed.
CL Clarification Requests				
CL-1	<u>Descriptions of monitoring start date</u> It is requested to clarify the monitoring start date in section A.1. of the registered GS-PDD.	1.4	The monitoring start date has been updated.	OK. It was confirmed that the monitoring start date was added appropriately to the revised monitoring report. CL-1 was closed.
CL-2	<u>Provision of wastewater analysis report</u> Please provide the analysis report of the wastewater and its layout drawing to demonstrate the conformance of the quality with the local regulations as per the monitoring plan.	5.8	The wastewater report and layout drawing have been provided.	OK. The wastewater analysis reports were provided with the flow-diagram of the wastewater treatment system. CL-2 was closed
CL-3	<u>Provision of evidence to demonstrate proper disposal of waste brick</u> Please provide evidence to demonstrate that the waste brick from line 2 was disposed or treated appropriately. There was the sales contract of the brick from line 3, but there was no contract of that of line 2.	5.11	The evidence for line 2 has been provided.	OK. The evidence was confirmed appropriate and sufficient. CL-3 was closed.
CL-4	<u>Cross-check of parameter EG_v</u> According to the monitoring plan, cross-checks with other meters of the power generation plant are specified, but not implemented in the monitoring report.	4.1	The cross-check has been added in the monitoring report.	OK. The cross check table was added and confirmed to be appropriate. CL-4 was closed.



CDM Verification Protocol for Hebei Yingxin Glass Group Co. Ltd. Glass Furnace Flue Gas Waste Heat To Energy Project

Table 2. Resolution of Corrective Actions and Clarification Requests

No. CAR, CL	Clarifications and corrective action requests by verification team	Sec. No. in Table 1	Summary of project owner response	Verification team Conclusion
FAR	Forward Action Requests			
FAR-1	<p><u>Keeping all the documents in a file relevant to meter calibration and maintenance</u></p> <p>For better preparations for next verification, it was recommended keeping all the documents relevant to meter calibration in a file.</p>	3.3	PO will keep all the calibration documents in a file for next verification.	OK. The response was confirmed.
FAR-2	<p><u>Preparation of the guidelines of the allowable gap for the cross check of electricity monitoring data</u></p> <p>Power generation data monitored at the power plant were cross checked every day with the corresponding data monitored at the glass plant data. However, there were no guidelines of the allowable limit of the gap between the two kinds of data specified to assess the cross check result.</p>	3.3	PO will make guidelines and present to the DOE during next verification.	OK. The response was confirmed.