# VERIFICATION AND CERTIFICATION REPORT

## - 5TH PERIODIC –

## CARBON ASSET MANAGEMENT SWEDEN AB

## ZHUMADIAN ZHONGYUAN GAS-STEAM COMBINED CYCLE POWER PROJECT IN HENAN CHINA

## UNFCCC REF. NO. : 2344

Monitoring Period: 2011-04-01 to 2011-11-30
(incl. both days)

**Report No: 8000403423-11/564**

**Date: 2014-05-28**

TÜV NORD CERT GmbH
JI/CDM Certification Program
Langemarckstraße, 20
45141 Essen, Germany
Phone: +49-201-825-3335
Fax: +49-201-825-2139
www.tuev-nord.de
www.global-warming.de

| | | | | | |
|---|---|---|---|---|---|
| **Verification Report:** | ***Report No.*** | | ***Rev. No.*** | ***Date of 1st issue:*** | ***Date of this rev.*** |
| | *8000403423-11/564* | | 0 | 2014-05-28 | 2014-05-28 |
| **Project:** | ***Title:*** | | | ***Registration date:*** | ***UNFCCC-No.:*** |
| | *Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China* | | | 2009-08-25 | 2344 |
| | | | | ***Verification No.:*** | |
| | | | | 5th periodic verification | |
| | ***Crediting period:*** | | | ***From:*** | ***To:*** |
| | ☒ *Renewable (7y)* ☐ *Fixed (10y)* | | | 2009-08-25 | 2016-08-24 |
| | ***Project Scale:*** | | | | |
| | ☒ *Large Scale* ☐ *Small Scale* | | | | |
| **Project Participant(s):** | ***Client:*** | | | | |
| | Carbon Asset Management Sweden AB | | | | |
| | ***Non Annex 1 country:*** | | | ***Annex 1 country:*** | |
| | China | | | Sweden, Switzerland | |
| | ***PP from non Annex 1 country:*** | | | ***PP from Annex 1 country:*** | |
| | Huaneng Henan Zhongyuan Gas Power Company Ltd | | | Carbon Asset Management Sweden AB | |
| **Applied methodology/ies:** | ***Title:*** | | | ***No.:*** | ***Scope(s) / TA(s)*** |
| | *Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas* | | | AM0029 ver. 3 | 1 / 1.1 |
| **Monitoring period and monitoring report** | ***Monitoring period (MP):*** | | | ***Monitoring Report:*** | |
| | ***From:*** | ***To:*** | ***No. of days:*** | ***Draft version:*** | ***Final version:*** |
| | 2011-04-01 | 2011-11-30 | ***244*** | 2011-12-16 | 2014-05-14 |
| **Verification team / Technical Review and Final Approval:** | ***Verification Team:*** | | | ***Technical review:*** | ***Final approval:*** |
| | TL: Li, Yongjun TM: Yu, Miao Liu, Haixu | | | | |
| **Key dates of verification:** | ***Publication of MR :*** | ***DVerR issued:*** | | ***On-site (from):*** | ***On-site (to):*** |
| | 2011-12-19 | 2012-01-19 | | 2012-01-13 | 2014-05-14 |
| **Summary of Verification opinion** | Carbon Asset Management Sweden AB has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 5th periodic verification of the project: "Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China", with regard to the relevant requirements for CDM project activities.<br>As a result of this verification, the verifier confirms that:<br>☒ all operations of the project are implemented and installed as planned and described in the validated project design document,<br>☒ the monitoring plan is in accordance with the applied approved CDM methodology,<br>☒ the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately,<br>☒ the monitoring system is in place and functional. The project has generated GHG emission reductions, and<br>☒ the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.<br>TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as listed below (verified amount). | | | | |
| **Emission reductions: [t $CO_{2e}$]** | ***Total verified amount*** | | | ***As per draft MR:*** | ***As per PDD:*** |
| | 102,619 | | | 102,619 | 858,165 /a |
| | | | | ***ER achieved up to*** | ***ER achieved from*** |

| | | ***2012-12-31*** | ***2013-01-01*** |
|---|---|---|---|
| | | 102,619 | 0 |
| **Document information:** | *Filename:* | | *No. of pages:* |
| | 2014-05-28 FVR_Zhumadian_5th.docx | | 85 |

## Abbreviations:

| | |
|---|---|
| **CA** | **Corrective Action / Clarification Action** |
| **CAR** | **Corrective Action Request** |
| **CCPG** | **Central China Power Grid** |
| **CDM** | **Clean Development Mechanism** |
| **CER** | **Certified Emission Reduction** |
| **$CO_2$** | **Carbon dioxide** |
| **$CO_{2eq}$** | **Carbon dioxide equivalent** |
| **CL** | **Clarification Request** |
| **DVerR** | **Draft Verification Report** |
| **ER** | **Emission Reduction** |
| **FAR** | **Forward Action Request** |
| **GC** | **Gas-phase chromatograph** |
| **GP** | **Grid Power Company** |
| **GHG** | **Greenhouse gas(es)** |
| **HR** | **Heat recovery** |
| **HRSG** | **Heat recovery steam generator** |
| **MP** | **Monitoring Plan** |
| **MR** | **Monitoring Report** |
| **NCV** | **Net Calorific Value** |
| **NG** | **Natural Gas** |
| **NGCC** | **Natural Gas fired Combined-Cycle** |
| **PA** | **Project Activity** |
| **PDD** | **Project Design Document** |
| **PP** | **Project Participant** |
| **QA/QC** | **Quality Assurance / Quality Control** |
| **UNFCCC** | **United Nations Framework Convention on Climate Change** |
| **VVS** | **Validation and Verification Standard** |
| **XLS** | **Emission Reduction Calculation Spread Sheet** |

## *Table of Contents* *Page*

# 1. INTRODUCTION

Carbon Asset Management Sweden AB has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the 5th periodic verification of the project

*"Zhumadian* Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China*"*

with regard to the relevant requirements for CDM project activities. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered CDM project.

GHG data for the monitoring period was verified in detailed manner applying the set of requirements, audit practices and principles as required under the Validation and Verification Standard /VVS/ of the UNFCCC.

This report summarizes the findings and conclusions of this 5th periodic verification of the above mentioned UNFCCC registered project activity.

## 1.1. Objective

The objective of the verification is the review and ex-post determination by an independent entity of the GHG emission reductions. It includes the verification of the:

- implementation and operation of the project activity as given in the PDD,
- compliance with applied approved methodology and the provisions of the monitoring plan,
- data given in the monitoring report by checking the monitoring records, the emissions reduction calculation and supporting evidence,
- accuracy of the monitoring equipment,
- quality of evidence,
- significance of reporting risks and risks of material misstatements.

## 1.2. Scope

The verification of this registered project is based on the validated project design document /PDD/, the monitoring report /MR/, emission reduction calculation spread sheet /XLS/, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification is carried out on the basis of the following requirements, applicable for this project activity:

- Article 12 of the Kyoto Protocol /KP/,
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 /MA/, and subsequent decisions made by the Executive Board and COP/MOP,
- other relevant rules, including the host country legislation,

- CDM Validation and Verification Standard /VVS/,
- monitoring plan as given in the registered PDD /PDD/,
- Approved CDM Methodology.

# 2. GHG PROJECT DESCRIPTION

## 2.1. Technical Project Description

The NGCC technology adopted in the proposed project consists of two phases of combined dynamic cycles: The first phase takes place in the gas turbine. The high temperature gas with about 1400°C is generated by natural gas combustion and is channelled afterwards through the gas turbine to power a coupled AC power generator to generate electricity. This is the Gas Cycle. In the second phase, the exhausted gas discharged from the gas turbine with about 600°C generates steam with 540°C temperature and 10.67MPa pressure in a heat recovery boiler, which then expands in the downstream steam turbine to generate electric power in the AC power generator again. This is the Steam Cycle. The reason of combining the two cycles is to generate electricity with quite high efficiency. The designed installed capacity of the Project is 2×377.2 MW, which is aimed at gross electricity generation of 2,640.4000GWh annually and 2,584.4235GWh electricity delivered to the Central China Power Grid (CCPG) via Henan Provincial grid annually.

The main equipments, e.g. two gas and steam turbines and appropriate generator equipment packages (2×377.2 MW), are provided jointly by a Company consortium from Shanghai and German Siemens respectively, which is well-known in the NGCC equipment production market.

The key parameters of the project are given in Table 2-1:

**Table 2-1:** Technical data of the project activity

| Parameter | Unit | Value |
|---|---|---|
| **Gas Turbine** | | |
| Manufacturer and Country of origin | | Siemens Co. in Germany |
| Type | | V94.3A |
| Rated speed | rpm | 3,000 |
| Flow rate of flue gas | t/h | 2396.5 |
| Temperature of flue gas | °C | 586.5 |
| Gas turbine output | MW | 243.4 |
| **Steam Turbine** | | |
| Manufacturer | | Shanghai Steam Turbine Co., Ltd |
| Type | | TCF-1 |
| Rated speed | rpm | 3,000 |
| Steam turbine output | MW | 133.8 |
| **HR boiler** | | |
| Manufacturer | | Wuhan Boiler Manufacture Co. |
| Feed water temperature | °C | 55 |
| **HRSG in Combined Cycle** | | |
| Manufacturer | | Shanghai Elec. Group Co. |
| Rated voltage | kV | 21 |

| Parameter | Unit | Value |
|---|---|---|
| Rated current | A | 13142 |
| Rated frequency | Hz | 50 |
| Rated speed | rpm | 3,000 |
| Output of generator | MVA | 478 |
| Total output for one set | MW | 377.2 |

The project is connected to CCPG via the transformer in the plant. The natural gas consumed as fuel in this project comes from "West-to-East natural gas transmission Pipeline" (via Southern Henan branch pipeline). No supply constrains were expected.

The commenced electricity generation of #1 gas turbine was on 4 June 2007, and the commenced electricity generation of #2 gas turbine was in December 2007. The commenced electricity generation of #1 steam turbine was in August 2007 and of #2 steam turbine in January 2008. The 1st renewable crediting period (7 years) started on 2009-08-25.

During the 5th periodic verification, covering the period 2011-04-01 to 2011-11-30, it was found that the technical parameters of the turbine and generator used under the project activity are identical as per description provided in the registered PDD and Monitoring Report.

The project complies with all relevant statutory requirements.

## 2.2. Project Location

The details of the project location are given in Table 2-2:

**Table 2-2:** Project Location

| No. | Project Location |
|---|---|
| Host Country | China |
| Region: | Henan Province |
| Project location address: | Zhumadian City |
| Latitude: | North-west corner: 32°57'31"<br>South-west corner: 32°57'22"<br>South-east corner: 32°57'22"<br>North-east corner: 32°57'31" |
| Longitude: | North-west corner: 114°03'39"<br>South-west corner: 114°03'39"<br>South-east corner: 114°03'52"<br>North-east corner: 114°03'52" |

## 2.3. Project Verification History

Essential events since the registration of the project are presented in the following Table 2-3.

**Table 2-3:** Status of previous Monitoring Periods

| # | Item | Time | Status |
|---|---|---|---|
| 1 | 1st Monitoring period | 2009-08-25 to 2010-02-28 | Issued |
| 2 | 2nd Monitoring period | 2010-03-01 to 2010-06-30 | Issued |
| 3 | 3rd Monitoring period | 2010-07-01 to 2010-11-30 | Issued |
| 4 | 4th Monitoring period | 2011-12-01 to 2011-03-31 | Issued |
| 5 | 5th Monitoring period | 2011-04-01 to 2011-11-30 | Ongoing |
| n | Renewal of Crediting Period | 2009-08-25 to 2016-08-24 | Approved |

An overview of all Post Registration Changes is given in the following table.

**Table 2-4:** Overview Post Registration Changes

| # | Applicable from – to / as of | MP | Type of post registration change [1)] | Description | Status[2)] / Date |
|---|---|---|---|---|---|
| 1 | N/A | | N/A | N/A | N/A |

1) TDfrMP : Temporary deviation from registered monitoring plan
TDfMM : Temporary deviation from the monitoring methodology
CrPDD : Corrections to the registered PDD
PCfrMP : Permanent changes from registered Monitoring Plan
PCfMM : Permanent changes from Monitoring Methodology
CoPD : Changes to the project design of a registered project activity

2) Approval (by EB) or Acceptance (by DOE)

# 3. METHODOLOGY AND VERIFICATION SEQUENCE

## 3.1. Verification Steps

The verification consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- A desk review of the Monitoring Report /MR/ submitted by the client and additional supporting documents with the use of customised verification protocol /CPM/ according to the Validation and Verification Standard /VVS/,
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

## 3.2. Contract review

To assure that

- the project falls within the scopes for which accreditation is held,
- the necessary competences to carry out the verification can be provided,
- Impartiality issues are clear and in line with the CDM accreditation requirements

a contract review was carried out before the contract was signed.

## 3.3. Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities a verification team, consisting of one team leader and 2 additional team members, was appointed.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the Table 3-1 below.

**Table 3-1:** Involved Personnel

| | Name | Company | Function [1] | Qualification Status [2] | Scheme competence [3] | Technical competence [4] | Verification competence [5] | Host country Competence | On-site visit |
|---|---|---|---|---|---|---|---|---|---|
| ☐ Mr. ☐ Ms. | Li, Yongjun | TN China | TL | SA | ☒ | | ☒ | ☒ | ☐ |
| ☐ Mr. ☒ Ms. | Yu, Miao | TN China | TM[A] | LA | ☒ | | ☒ | ☒ | ☒ |
| ☒ Mr. ☐ Ms. | Wu, Jianmin | | ETE | TE | ☒ | 1.1 | ☒ | ☒ | ☒ |
| ☒ Mr. ☐ Ms. | Rainer Winter | TN CERT | TR[B] | SA | ☒ | 1.1 | ☒ | ☐ | - |
| ☒ Mr. ☐ Ms. | Jochen Schubert | TN CERT | TR/ FA[B] | SA | ☒ | | ☒ | ☐ | - |

1) TL: Team Leader; TM: Team Member, TR: Technical review; OT: Observer-Team, OR: Observer-TR; FA: Final approval

2) GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

3) GHG auditor status (at least Assessor)

4) As per S01-MU03 or S01-VA070-A2 (such as 1.1, 1.2, …)

5) In case of verification projects

A) Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

B) No team member

All team members contributed to the review of documents, the assessment of the project activity and to the preparation of this report under the leadership of the team leader.

Technical experts contributed to the assessment of special aspects of the project activity, e.g. technical or host country aspects.

Statements of competence for the above mentioned team members are enclosed in annex 2 of this report.

## 3.4. Publication of the Monitoring Report

In accordance with the CDM M&P (§ 62) the draft monitoring report, as received from the project participants, has been made publicly available on the dedicated UNFCCC CDM website prior to the verification activity commenced. Comments received are taken into account in the course of the verification, if applicable.

## 3.5. Verification Planning

In order to ensure a complete, transparent and timely execution of the verification task the team leader has planned the complete sequence of events necessary to arrive at a substantiated final verification opinion.

Various tools have been established in order to ensure an effective verification planning.

Risk analysis and detailed audit testing planning

For the identification of potential reporting risks and the necessary detailed audit testing procedures for residual risk areas table A-1 is used. The structure and content of this table is given in Table 3-2 below.

**Table 3-2:** Table A-1; Identification of verification risk areas

| ***Table A-1: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing*** | | | | |
|---|---|---|---|---|
| **Identification of potential reporting risk** | **Identification, assessment and testing of management controls** | **Areas of residual risks** | **Additional verification testing performed** | **Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)** |
| *The following potential risks were identified and divided and structured according to the possible areas of occurance.* | *The potential risks of raw data generation have been identified in the course of the monitoring system implementation.*<br>*The following measures were taken in order to minimize the corresponding risks.*<br>*The following measures are implemented:* | *Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of every verification.* | *The additional verification testing performed is described. Testing may include:*<br>- *Sample cross checking of manual transfers of data*<br>- *Recalculation*<br>- *Spreadsheet 'walk throughs' to check links and equations*<br>- *Inspection of calibration and maintenance records for key equipment*<br>- *Check sampling analysis results*<br>*Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.* | *Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.* |

The completed table A-1 is enclosed in Annex 1 (table A-1) to this report.

Project specific periodic verification checklist

In order to ensure transparency and consideration of all relevant assessment criteria, a project specific verification protocol has been developed. The protocol shows, in a transparent manner, criteria and requirements, means and results of the verification. The verification protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet for verification
- It ensures a transparent verification process where the verifying DOE documents how a particular requirement has been proved and the result of the verification.

The basic structure of this project specific verification protocol for the periodic verification is described in Table 3-3.

**Table 3-3:** Table A-2; Structure of the project specific periodic verification checklist

| ***Table A-2: Periodic verification checklist*** | | | | |
|---|---|---|---|---|
| ***Checklist Item*** | ***Reference*** | ***Verification Team Comments*** | ***Draft Conclusion*** | ***Final Conclusion*** |
| *The checklist items in Table A-2 are linked to the various require-ments the monitoring of the project should meet. The checklist is organised in various sections as per the requirements of the topic and the individual project activity. It further includes guidance for the verification team.* | *Gives reference to the information source on which the assessment is based on.* | *The section is used to elaborate and discuss the checklist item in detail. It includes the assessment of the verification team and how the assessment was carried out. The reporting requirements of the VVS shall be covered in this section.* | *Assessment based on evidence provided if the criterion is fulfilled (OK), or a CAR, CL or FAR (see below) is raised. The assessment refers to the draft verifi-cation stage.* | *In case of a corrective action or a clarification the final assessment at the final verification stage is given.* |

The periodic verification checklist (verification protocol) is the backbone of the complete verification starting from the desk review until final assessment. Detailed assessments and findings are discussed within this checklist and not necessarily repeated in the main text of this report.

The completed verification protocol is enclosed in Annex 1 (table A-2) to this report.

## 3.6. Desk review

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- the last revision of the PDD including the monitoring plan[/PDD/],
- the last revision of the validation report[/VAL/],
- documentation of previous verifications[/VER/]
- the monitoring report, including the claimed emission reductions for the project[/MR/],
- the emission reduction calculation spreadsheet[/XLS/].

Other supporting documents, such as publicly available information on the UNFCCC website and background information were also reviewed.

## 3.7. On-site assessment

As most essential part of the verification exercise it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include, but are not limited to:

- The monitoring data were checked completely.
- An assessment of the implementation and operation of the registered project activity as per the registered PDD or any approved revised PDD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;
- A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology and corresponding tool(s), where applicable;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- 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.
-

Before and during the on-site visit the verification team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Representatives of Carbon Asset Management Sweden AB and Beijing MD Energy Technology Co., Ltd. (project consultant), and the operational staff of the plant were interviewed. The main topics of the interviews are summarised in Table 3-4.

**Table 3-4:** Interviewed persons and interview topics

| Interviewed Persons / Entities | Interview topics |
|---|---|
| 1. Projects & Operations Personnel, Huaneng Zhongyuan Gas Power Company Ltd. /IM01/<br>2. Consultant, Beijing MD Energy Technology Co., Ltd. /IM02/<br>3. Gas Supplier, PetroChina Company Limited | - General aspects of the project<br>- Technical equipment and operation<br>- Changes since validation<br>- Monitoring and measurement equipment<br>- Remaining issues from validation<br>- Calibration procedures<br>- Quality management system<br>- Involved personnel and responsibilities<br>- Training and practice of the operational personnel<br>- Implementation of the monitoring plan<br>- Monitoring data management<br>- Data uncertainty and residual risks<br>- GHG emission reduction calculation<br>- Procedural aspects of the verification<br>- Maintenance<br>- Availbility of NG<br>- Environmental aspect<br>- Grid connection and power supply related aspects |

The list of interviewees is included in chapter 7.4.

## 3.8. Draft verification reporting

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification protocol is completed. This protocol together with a general project and procedural description of the verification and a detailed list of the verification findings form the draft verification report. This report is sent to the client for resolution of raised CARs, CLs and FARs.

## 3.9. Resolution of CARs, CLs and FARs

Nonconformities raised during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

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

The verification team uses the term Clarification Request (CL), which is be issued if:

- information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the monitoring and reporting require attention and / or adjustment for the next verification period.

For a detailed list of all CARs, CLs and FARs raised in the course of the verification pl. refer to chapter 4.

## 3.10. Final reporting

Upon successful closure of all raised CARs and CLs the final verification report including a positive verification opinion can be issued. In case not all essential issues could finally be resolved, a final report including a negative verification opinion is issued.

The final report summarizes the final assessments w.r.t. all applicable criteria.

## 3.11. Technical review

Before submission of the final verification report a technical review of the whole verification procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is not considered to be part of the verification team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the verification opinion and the topic specific assessments as prepared by the verification team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

## 3.12. Final approval

After successful technical review an overall (esp. procedural) assessment of the complete verification will be carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the request for issuance can be started.

# 4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report/MR/, the calculation spreadsheet/XLS/, PDD/PDD/, the Validation Report/VAL/ and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, CL and FAR issued are shown in Table 4-1:

**Table 4-1:** Summary of CAR, CL and FAR

| Verification topic | No. of CAR | No. of CL | No. of FAR |
|---|---|---|---|
| A – Description of project activity | 0 | 0 | 0 |
| B – Implementation of project activity | 0 | 0 | 0 |
| C – Description of monitoring system | 0 | 0 | 0 |
| D – Data and parameters | 0 | 2 | 0 |
| E - Calculation of Emission Reductions | 1 | 0 | 0 |
| **SUM** | **1** | **2** | **0** |

The following tables include all raised CARs, CLs and FARs and the assessments of the same by the verification team. For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

| Finding | **D1** | | |
|---|---|---|---|
| **Classification** | ☐ CAR | ☒ CL | ☐ FAR |
| **Description of finding** *Describe the finding in unambiguous style; address the context (e.g. section)* | The electricity generation during September and October in 2011 is much lower than amount of other months. Clarification is required. | | |
| **Corrective Action #1** *This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.* | The electricity generation is determined by the grid dispatching and the supply of natural gas, which are not controlled by the project developer. Meanwhile, generation units were under maintenance during September and October in 2011, the outage time of 1# unit was 29 days, and the outage time of 2# unit was 50 days. The relevant evidence has been provided to DOE. | | |
| | ☒ Changes in MR | Section(s):D | New version No.:2 |
| | ☐ Changes in XLS | Worksheet(s): | New version No.: |

| Finding | D1 |
|---|---|
| **DOE Assessment #1**<br>*The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.* | By means of interview and documents view (including daily and monthly electricity meter readings[/DMR//MMR/], daily operation and maintenance record, equipments Check & maintenance log[/O&M/] and the statement regarding the outage from project owner[/SO/]), it is confirmed there is no special event occurred and the outage is due to normally maintenance.<br>The CL D1 is closed. |
| **Conclusion**<br>*Tick the appropriate checkbox* | ☐ To be checked during the next periodic verification<br>☐ Additional action should be taken (finding remains open)<br>☒ The finding is closed |

| Finding | D2 | | |
|---|---|---|---|
| **Classification** | ☐ CAR | ☒ CL | ☐ FAR |
| **Description of finding**<br>*Describe the finding in unambiguous style; address the context (e.g. section)* | The type of the gas flow meter is not consistent with the on-site investigation. Clarification is required. | | |
| **Corrective Action #1**<br>*This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.* | The type of the gas flow meter is editorial error in MR Version 01, which has been revised. | | |
| | ☒ Changes in MR | Section(s): D | New version No.:2 |
| | ☐ Changes in XLS | Worksheet(s): | New version No.: |
| **DOE Assessment #1**<br>*The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.* | The updated MR has been checked. The nameplate and the calibration reports have been cross-checked. It is confirmed the type of the gas flow meter is correct now.<br>The CL D2 is closed. | | |
| **Conclusion**<br>*Tick the appropriate checkbox* | ☐ To be checked during the next periodic verification<br>☐ Additional action should be taken (finding remains open)<br>☒ The finding is closed | | |

| Finding | E1 | | |
|---|---|---|---|
| **Classification** | ☒ CAR | ☒ CL | ☐ FAR |
| **Description of finding**<br>*Describe the finding in unambiguous style; address the context (e.g. section)* | The PLF during the 5th monitoring period is much higher than the value in registered PDD. Further clarification is requested. | | |

| Finding | **E1** |
|---|---|
| **Corrective Action #1**<br>*This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.* | In the first half year of 2011, a power supply shortage took place in china due to the following reasons[1]:<br>1) the water-flow of most rivers is less than the normal year, thus the operation condition of hydropower stations are poorer than normal year;<br>2) Supply of coal used for power generation was insufficient, thus the operation condition is poorer than before.<br><br>In order to meet the power demand and mitigate the shortage of power supply, the local power grid required the PO to increase the power generation during this period. Meantime, there is an adequate supply of natural gas which can meet the demand of the power plant for generation. This is why the PLF during this monitoring period is much higher than the value in registered PDD.<br>☒ Changes in MR \| Section(s):E \| New version No.:2<br>☐ Changes in XLS \| Worksheet(s): \| New version No.: |
| **DOE Assessment #1**<br>*The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.* | The PLF during the 5th monitoring period is 0.531, while the value is 0.391 in registered PDD. The higher PLF value is due to the requirement of the Power Grid Company who has to dispatch the power when the shortage of power supply happened. The statement from the power grid company/SPD/ has been checked. The requirement is temporary and it is confirmed there is no sign change for the project by means of on-site investigation.<br>The CAR E1 is closed. |
| **Conclusion**<br>*Tick the appropriate checkbox* | ☐ To be checked during the next periodic verification<br>☐ Additional action should be taken (finding remains open)<br>☒ The finding is closed |

[1] http://www.sdpc.gov.cn/jjxsfx/t20110729_426321.htm

# 5. SUMMARY OF VERIFICATION ASSESSMENTS

The following paragraphs include the summary of the final verification assessments after all CARs and CLs are closed out. For details of the assessments pl. refer to the discussion of the verification findings in chapter 4 and the verification protocol (Annex 1).

## 5.1. Involved Parties and Project Participants

The following parties to the Kyoto Protocol and project participants are involved in this project activity.

**Table 5-1:** Project Parties and project participants

| Characteristic | Party | Project Participant |
|---|---|---|
| Non-Annex 1 | China | Huaneng Henan Zhongyuan Gas Power Company Ltd |
| Annex 1 | Sweden, Switzerland | Carbon Asset Management Sweden AB |

## 5.2. Implementation of the project

During the verification a site visit was carried out. On the basis of this site visit and the reviewed project documentation it can be confirmed that w.r.t. the realized technology, the project equipments, as well as the monitoring and main metering equipment, the project has been implemented and operated as described in the registered PDD/PDD/.

The project exported electricity to the Central China Power Grid (CCPG). The recorded generation data/DMR/, meter readings/MMR/, meter calibration certificates/CAL/, monthly electricity sale/purchase-invoices, power balance sheet/INO/ and plant operation records/O&M/ were verified by the verification team during the on site visit.
The commenced electricity generation of #1 gas turbine is in June 2007, and the commenced electricity generation of #2 gas turbine is in December 2007. The commenced electricity generation of #1 steam turbine is in August 2007 and #2 steam turbine is in January 2008. Electricity generated by the project is transmitted to Chaya Transformer Substation (500kV Zhoucha Line) and then to Central China Power Grid (CCPG). CCPG contains of Henan, Hubei, Hunan, Jiangxi, Sichuan and Chongqing Power Grid. All required equipments and procedures are available and implemented in an appropriate manner.

All necessary monitoring instruments are installed. The measuring devices are well known and state-of-the-art. All required instruments including stand by and operating procedures for the same have been implemented in an appropriate manner.

For the electric metering purpose, three sealed meters i.e. Meter No.1, Meter No.2 and Meter No.3 are installed for measuring the net electricity delivered to the grid. The Meter No.1 and Meter No.2 are bidirectional meters with accuracy 0.2S located on the Plant side of the 500kV Chaya main substation, which is used as invoice meters measuring exported and imported power. The dual meters are set up, one is the primary meter and another is the backup one. In case the meter No.1 is detected in fault, the backup meter No.2 will replace the No.1 for billing. These two meters have reverse metering function to measure the electricity purchased and supplied. During this monitoring period, there is no malfunction detected in meter No.1, therefore meter No.2 was not required for electricity metering. The meter reading time is fixed at 00:00 on the first day of each month. The Meter No.3 with accuracy of 0.2S is located at project site and used for measuring the imported electricity purchased from gird in case the electricity is needed for starting up the power units. The electricity is measured continuously and recorded monthly. The meter has been jointly read by the Grid Company and PP together and reading records are confirmed by both sides. It is cross-checked by alternative meter with accuracy of 0.2S installed on Xiaozhuyuan (XZY) substation.

There is no malfunction of Meter No.1, No.2 and No.3 during this monitoring period. All three meters mentioned above are calibrated quarterly by a third party institute. The calibration is valid during this monitoring period. Neither mistakes nor malfunction have been observed during this monitoring period.

**Table 5-1:** Key electric meters information

| Item | Serial No. | Type | Accuracy | Calibration Date | Calibration valid until | Calibration entity |
|---|---|---|---|---|---|---|
| Meter No.1 | 18450580 | WU. TE432S | 0.2s | 2011-01-12 | 2011-04-11 | Testing and Research Institute of Henan Electric Power Research Institute, which is authorized by Administration of Quality and Technology Supervision of Henan Province. |
| | | | | 2011-04-10 | 2011-07-09 | |
| | | | | 2011-07-08 | 2011-10-07 | |
| | | | | 2011-10-06 | 2012-01-05 | |
| Meter No.2 | 18450567 | WU. TE432S | 0.2s | 2011-01-12 | 2011-04-11 | |
| | | | | 2011-04-10 | 2011-07-09 | |
| | | | | 2011-07-08 | 2011-10-07 | |
| | | | | 2011-10-06 | 2012-01-05 | |
| Meter No.3 | 33049113 | SL7000 | 0.2s | 2011-01-12 | 2011-04-11 | |
| | | | | 2011-04-10 | 2011-07-09 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 2011-07-08 | 2011-10-07 | |
| | | | | 2011-10-06 | 2012-01-05 | |

**Table 5-2:** Key transformer information

| Item | Serial No. | Ratio | Calibration Date | Calibration valid until | Calibration entity |
|---|---|---|---|---|---|
| **PT (M1& M2)** | A: 06-1100<br>B: 06-1093<br>C: 06-1094 | 5000 | 2006-11-28 to 2006-12-01 | 2016-11-30 | Testing and Research Institute of Henan Electric Power Institute, which is authorized by Administration of Quality and Technology Supervision of Henan Province. |
| **CT (M1& M2)** | A: 050761<br>B: 050765<br>C: 050762 | 1500 | 2006-11-28 to 2006-12-01 | 2016-11-30 | |

The calibration records of all installed measurement devices as well as the Current Transformer (CT) / Potential Transformer (PT) which covered this monitoring period were checked and assessed to be credible and appropriate.

For the natural gas metering purpose, two sealed Gas Flow Meters i.e. Gas Meter No.1 and Gas Meter No.2 are installed for measuring the natural gas consumed by the project located in front of the natural gas delivery point belong to gas supplier side. The two turbo type gas meters with accuracy 1.0 are used as invoice meters. The gas consumptions are measured continuously and recorded daily. The meter reading records/MMR/ are confirmed by the Gas Company and PP together. The two meters mentioned above are calibrated yearly by a third party institute. Neither mistakes nor malfunction have been observed during this monitoring period.

Four backup Ultrasonic Gas Flow Meter No.3, No.4, No.5 and No.6 have been installed on 2010-11-21 to replace the four backup Turbo Gas Flow Meter No.3, No.4, No.5 and No.6. The installed ultrasonic gas flow meters (with type CL-2-2-250 and the accuracy 1.0) had been calibrated before installation. After the installation, the meters will be calibrated yearly and the meter reading will be recorded on daily basis.

The daily record of turbo gas flow meters and ultrasonic gas flow meters have been checked. The meters are calibrated yearly by a third party institute. The calibrations are valid during this monitoring period. Neither mistakes nor malfunction have been observed during this monitoring period.

During the 5th monitoring period, the gas consumption value applied for ER calculation was from gas flow meter No.1 and No.2. The backup gas flow meters (No.3, No.4, No.5, No.6) were not applied for measuring the gas amount and have no impact on the calculation of emission reduction. The value has been cross-checked by the data from the back-up gas flow meters.

**Table 5-3:** Key gas flow meters information

| Item | Serial No. | Type | Accuracy | Calibration date | Calibration valid until | Calibration entity |
|---|---|---|---|---|---|---|
| Gas Meter No.1 | 83034891 | TRZ-IFSG4000DN300ANSI600 | 1.0 | 2010-12-06 | 2011-12-05 | Henan Institute of metrology and Testing, which is authorized by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China. |
| Gas Meter No.2 | 83034059 | | 1.0 | 2010-11-17 | 2011-11-16 | |
| | | | | 2011-10-09 | 2012-10-08 | Nanjing Branch of National Station of Petroleum & Natrural Gas flow Measurement which is authorized by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China. |

**Table 5-4:** On-line gas-phase chromatograph

| Name | Serial No. | Type | Manufacture | Calibration date | Calibration valid until | Calibration entity |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| on-line gas-phase chroma-tograph | 100839 | BTU-8000 | ABB | 2010-05-28 | 2011-05-27 | National Institute of Metrology P.R.China, which is authorized by Certification and Accreditation Administration of the People's Republic of China |
| | | | | 2011-05-26 | 2012-05-25 | |

The measurement of the NCV is carried out by an on-line gas-phase chromatograph by acquiring the gas sample from the continuous operated sampling line which is linked with the gas flow at the Xuedian Station of Petrol China "West-to-East natural gas transmission". The calibration records of all installed measurement devices as well as the on-line gas-phase chromatograph which covered this monitoring period were checked and assessed to be credible and appropriate.

There happened no physical change and no accident to the project during the monitoring period/LOG/.

An emergency back-up rechargeable cell was installed for emergency response (i.e. power source breakdown). The diesel generator was stopped using during the 5th monitoring period.

The submitted monitoring report which forms the basis of the verification was prepared by summarizing consolidated monthly data of net electricity supplied, natural gas delivered and NCV value over the whole monitoring period in accordance with the registered PDD/PDD/.

During the monitoring period, the project exported 2,347,518.06 MWh of net electricity and consumed 460,393,600 $Nm^3$ of natural gas. The net electricity supplied and the natural gas consumed are verified by the verification team during the on site visit by checking the Monthly Meter reading records/MMR/ and Daily Meter reading records/DMR/. The data was also cross-checked with the electricity sale/purchase invoices and gas purchase invoices.

## 5.3. Project history

During the validation the validating DOE might have raised issues that could not be closed or resolved during the validation stage. For this purpose FARs might have been raised. No such issues were identified for this project.

## 5.4. Post registration changes

No special events with effect on the monitoring of the project have been observed during the 5th monitoring period.

## 5.5. Compliance with the monitoring plan

The monitoring system and all applied procedures are completely in compliance to the registered monitoring plan.

## 5.6. Compliance with the monitoring methodology

The monitoring system is in compliance with the applied monitoring methodology AM0029 (version 3).

## 5.7. Monitoring parameters

During the verification all relevant monitoring parameters (as listed in chapter B.7.1 of the PDD) have been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, the accuracy, and applied QA/QC measures. The results as well as the verification procedure are described parameter-wise in the project specific verification checklist.

After appropriate corrections were carried out by the project participant it can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements.

## 5.8. Monitoring report

A draft monitoring report was submitted to the verification team by the project participants. The team has made this report publicly available prior to the start of the verification activities. No comments were received.

During the verification, mistakes and needs for clarification were identified. The PP has carried out the requested corrections so that it can be confirmed that the Monitoring report is complete and transparent and in accordance with the registered PDD and other relevant requirements.

## 5.9. Sampling

### 5.9.1. Implementation of the sampling plan

No sampling was required to determine the monitored parameters.

### 5.9.2. Sampling approaches during verification

No sampling approaches were taken during the verification.

## 5.10. ER Calculation

According to the validated PDD, the approved baseline and monitoring methodology AM0029 Ver.3 is applied to the project.

GHG emission reduction is calculated as baseline emission minus project emission and leakage emission.

For the calculation of baseline emissions the ex-post determined value of baseline parameters, i.e., the latest value of CCPG Emission Factor available at the DNA website at the time of verification was used.

***Baseline Emissions:***

The formula used for the determination of baseline emissions which is consistent with the PDD and revised Monitoring Report:

| | | | | |
|---|---|---|---|---|
| Baseline Emissions = | Grid BM Emission Factor | x | Net Electricity Export |
| 983,786 $tCO_{2e}$ = | 0.4191 $tCO_{2e}$/MWh | x | 2,347,518.06 MWh/y |

The baseline emissions ($BE_y$) during the monitoring period are 983,786 $tCO_{2e}$.

Following documents/records were verified by the audit team:

- Monthly invoices from 2011-04-01 to 2011-11-30 /INO/.
- Monthly electricity balance sheet issued by GP from 2011-04-01 to 2011-11-30/INO/.
- Daily meter readings from 2011-04-01 to 2011-11-30 /DMR/.
- Monthly meter readings from 2011-04-01 to 2011-11-30/MMR/.
- Meters calibration records (covering the monitoring period) /CAL1/.

All the figures as per the monitoring report were cross-checked by the verification team against basic monitored data.

The data used for the baseline emission reduction calculation were derived from the meter readings as well as monthly electricity balance sheets. All the data were issued or confirmed by the GP and cross checked with the monthly invoices.

***Project Emission:***

The formula used for the determination of project emissions is consistent with the PDD and revised Monitoring Report:

| | | | |
|---|---|---|---|
| Project Emissions = | total NG combusted | x | $CO_2$ emission coefficient of NG ($NCV_{NG}$ x $EF_{CO2,NG,y}$ x $OXID_{NG}$) |
| 881,166 $tCO_{2e}$ | = 460,393,600 $Nm^3$ | x | 34.1166 x 15.30 x1.00 x 44/12/10^6 $tCO_{2e}/Nm^3$ |

The project emissions ($PE_y$) during the monitoring period are 881,166 $tCO_{2e}$.

Following documents/records were verified by the audit team:

- Monthly NG invoices from 2011-04-01 to 2011-11-30 /INO/

- Monthly NG balance sheet issued by Gas Supplier from 2011-04-01 to 2011-11-30. /INO/

- Daily gas meter readings from 2011-04-01 to 2011-11-30 /DMR/

- Monthly gas meter readings from 2011-04-01 to 2011-11-30. /MMR/

- Gas Meters calibration records (covered the monitoring period). /CAL2/

All the figures as per the monitoring report were cross-checked by the verification team against basic monitored data.

The data used for the baseline emission reduction calculation were derived from the gas meter readings and cross checked with NG balance sheets. All the data were issued or confirmed by the Gas Supplier and cross checked by the monthly invoices.

No other fuel has been used during the monitoring period.

***Project Leakage:***

The formula used for the determination of project leakage which is consistent with the methodology and the Monitoring Report:

| | | | |
|---|---|---|---|
| Project Leakage = | $FC_y$ x $NCV_{NG,y}$ x $EF_{NG,upstream,CH4}$ x 21 - | | $EGG_{PJ,y}$ x $EF_{BL,upstream,CH4}$ x 21 |
| -54,497 $tCO_{2e}$ = | 2649.291 $tCO_{2e}$ x 21 | - | 7244.43 $tCO_{2e}$ x 21 |

According to the AM0029 version3, negative leakage should be considered as zero. Therefore Leakage ($LE_y$) during the monitoring period is 0 $tCO_{2e}$.
Following documents/records were verified by the audit team:

- Every ten days meter readings of NCV value from 2011-04-01 to 2011-11-30. /MMR/

- On-line gas-phase chromatograph calibration records (covering the monitoring period[/CAL3/]

All the figures as per the monitoring report were cross-checked by the verification team against basic monitored data.

The data used for the baseline emission reduction calculation were derived from the on-line gas-phase chromatograph readings. All the data were issued by the Gas Supplier.

LNG is not used in the project plant and no natural gas from Annex I countries which could lead to upstream emission has been used in the project plant.

GHG emission reduction is calculated as baseline emission minus project emission and leakage emission.

| | | | | | | |
|---|---|---|---|---|---|---|
| $ER_y$ | = | $BE_y$ | - | $PE_y$ | - | $LE_y$ |
| 102,619 $tCO_{2e}$ | = | 983,786 $tCO_{2e}$ | - | 881,166 $tCO_{2e}$ | - | 0 $tCO_{2e}$ |

The emission reduction ($ER_y$) during the monitoring period is 102,619 $tCO_{2e}$.

## 5.11. Quality Management

Quality Management procedures for measurements, collection and compilation of data, data storage and archiving, calibration, maintenance and training of personnel in the framework of this CDM project activity have been defined in a monitoring manual and relevant procedure. The procedures defined can be assessed as appropriate for the purposes indicated above. No significant deviations thereof have been observed during the verification.

The data recorder list was established and all monitored data are archived both in physical (daily data) and in electronic form. The data will be kept for the whole crediting period and additional 2 years as given in the PDD.

Meters calibration plan was established and followed, the electric meters will be calibrated quarterly; the gas flow meters and gas-phase chromatograph will be calibrated yearly. The calibration records covering the monitoring period were maintained.

Internal audit was planed and performed once every monitoring period, the latest internal audit was performed on 2012-01-05 and records are maintained. Records have been checked by the validation team. No special events or events outside the range have been observed.

All necessary and requested documentation was provided by the project participants so that a complete verification of all relevant issues could be carried out.

Access was granted to all installations of the plant which are relevant for the project performance and the monitoring activities.

No issues have been identified indicating that the implementation of the project activity and the steps to claim emission reductions are not compliant with the UNFCCC criteria and relevant guidance provided by the COP/CMP and the CDM EB (clarifications and/or guidance).

## 5.12. Actual emission reductions during the first commitment period and the period from 1 January 2013 onwards

The MR includes actual ER values achieved up to 31 December 2012 and actual values achieved from 1 January 2013 onwards as follows:

**Table 5-2:** Emission reductions before and after the end of 2012

| | until 2012-12-31 [1)] | from 2013-01-01 [1)] | Sum |
|---|---|---|---|
| Emission reductions [$tCO_{2e}$] | 102,619 | 0 | 102,619 |

[1)] Both days included

## 5.13. Comparison with ex-ante estimated emission reductions

During the monitoring period (from 2011-04-01 to 2011-11-30) the actual ER of the project is 102,619 $tCO_{2e}$, which is 82.1% lower than the estimated in registered PDD 573,677 $tCO_{2e}$ (858,165 $tCO_{2e}$ annually).

To receive a clearer picture fully year comparison has been conducted. The result of one year (from 2010-12-01 to 2011-11-30) is 157,500 $tCO_{2e}$, which is 81.6% lower than the ER estimated in the registered PDD (858,165 $tCO_{2e}$). The full year data has been checked by the verification team and could be confirmed.

The calculated value was found to be proportionally lower than the ex-post determined value, thus no further justification was required.

## 5.14. Overall Aspects of the Verification

All necessary and requested documentation was provided by the project participants so that a complete verification of all relevant issues could be carried out.

Access was granted to all installations of the plant which are relevant for the project performance and the monitoring activities.

No issues have been identified indicating that the implementation of the project activity and the steps to claim emission reductions are not compliant with the

UNFCCC criteria and relevant guidance provided by the COP/CMP and the CDM EB (clarifications and/or guidance).

## 5.15. Hints for next periodic Verification

There is no hint for next periodic verification.

# 6. VERIFICATION AND CERTIFICATION STATEMENT

Carbon Asset Management Sweden AB has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 5th periodic verification of the project: "Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China", with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions due to electricity generation by utilizing of available natural gas. This verification covers the period from 2011-04-01 to 2011-11-30 (including both days).

In the course of the verification 1 Corrective Action Requests (CAR) and 2 Clarification Requests (CL) were raised and successfully closed. The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the registered PDD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of this verification, the verifier confirms 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 approved CDM methodology, i.e., AM0029 ver. 3
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 5th periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: 102,619 t $CO_{2e}$

Shanghai, 2014-05-28

Li Yong Jun

TÜV NORD JI/CDM Certification Program

Essen, 2014-05-28

Jochen Schubert

TÜV NORD JI/CDM Certification Program

Verification Team Leader

Final Approval

# 7. REFERENCES

**Table 7-1:** Documents provided by the project participant(s)

| Reference | Document |
|---|---|
| **/BL/** | Business License |
| **/CAL1/** | 1. Calibration Certificate of Electric Meter1, Meter2 and Meter3 covering the 5th monitoring period<br>2. Procedure of control of monitoring meters.<br>3. Metering standards (national industry standard DL/T448-2000).<br>4. Metering calibration standards including Power metering device calibration standards (SD109-83) and Electric meter standards JJG596-1999<br>5. Certificate of electric meter calibration entity, Certificate No. Yu Ji[2006]Shou 0035<br>6. Calibration Certificate for PT & CT- Testing and Research Institute of Henan Electric Power Institute, which is authorized by Administration of Quality and Technology Supervision of Henan Province. |
| **/CAL2/** | 1. Calibration Certificate of Gas Flow Meter1 and Meter2 covering the 5th monitoring period<br>2. Calibration Certificate of Ultrasonic Gas Meter3, Meter4, Meter5 and Meter6(installed during this monitoring period) covering the 5th monitoring period<br>3. Procedure of control of monitoring meters.<br>4. Gas Flow Metering standards (national standard GB/T18603-2001, JJG 1037-2008 and JJG 198-1994)<br>5. Gas Flow Meter Calibration standards (national standard JJG1029-2007, JJG1037-2008 and JJG 1030-2007)<br>6. Certificate of gas flow meter calibration entity, Certificate No. (Guo) Fa Ji[2007]01031 |
| **/CAL3/** | 1. Calibration Certificate of on-line gas-phase chromatograph covering the 5th monitoring period<br>2. Procedure of control of monitoring device.<br>3. Gas-phase chromatograph standards (national standard GB/T13610-2003)<br>4. Certificate of on-line gas-phase chromatograph calibration entity |
| **/DGO/** | Diesel Generator Operation Documents<br>The approval letter of termination of diesel generator utilization for emergency power |
| **/DMR/** | 1. Daily Electric Meter1, Meter2 and Meter 3 Reading Record covering 2011- |

| Reference | Document |
|---|---|
| | 04-01 to 2011-11-30.<br>2. Daily gas flow Meter1, Meter2, Meter 3, Meter 4, Meter 5 and Meter 6 Reading Record covering 2011-04-01 to 2011-11-30<br>3. Ultrasonic Gas Meter 3, Meter 4, Meter 5 and Meter 6 Reading Record covering 2011-04-01 to 2011-11-30 |
| **/EPCA/** | Environmental Protection Check and Acceptance Letter, issued by Ministry of Environmental Protection of the People's Republic of China on 16 June 2009, Document No. Huan Yan [2009]171 |
| **/GCA/** | Grid connection and dispatching agreement, signed by Central China Power Grid Co., Ltd and Henan Zhongyuan Gas Power Plant, on 23 March 2007 |
| **/IAR/** | Internal Audit Report on 2012-01-05 |
| **/INO/** | 1. Monthly electricity invoices covering 2011-04-01 to 2011-11-30<br>2. Monthly electricity balance sheet/transaction note issued by GP covering 2011-04-01 to 2011-11-30<br>3. Monthly gas invoices covering 2011-04-01 to 2011-11-30.<br>4. Monthly gas balance sheet/transaction note covering 2011-04-01 to 2011-11-30. |
| **/LOG/** | 1. Sample copy of project operation records<br>2. Equipments daily check log |
| **/LGS/** | Letter from gas supplier which confirms the Gas composition data is not available. |
| **/MM/** | Monitoring Manual |
| **/QA/** | QA/QC procedures |
| **/MMR/** | 1. Monthly electricity Meter reading records which are confirmed by GP covering 2011-04-01 to 2011-11-30<br>2. Monthly gas Meter reading records which are confirmed by Gas supplier covering 2011-04-01 to 2011-11-30<br>3. NCV reading records which are confirmed by the gas supplier Petrol China Company Ltd. covering 2011-04-01 to 2011-11-30 |
| **/MR/** | 1. Monitoring report 'Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China' for the 5$^{th}$ periodic verification 2011-04-01 to 2011-11-30, version 01, dated 2011-12-16.<br>2. Monitoring report 'Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China' for the 5$^{th}$ periodic verification 2011-04-01 |

| Reference | Document |
|---|---|
| | to 2011-11-30, version 02, dated 2012-02-16.<br>3. Monitoring report 'Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China' for the 5th periodic verification 2011-04-01 to 2011-11-30, version 03, dated 2014-05-14. |
| **/NOSR/** | NGCC Operation Safety Management Regulations |
| **/O&M/** | 1. Project Operation and Maintenance Records/Equipments Check & maintenance log<br>2. Sample copy of O&M records |
| **/PHT/** | Photographs of Project Site |
| **/PPSC/** | 1. Power Purchase and Sale Contract signed by Huaneng Zhongyuan Gas Power Plant and Henan Electric Power Company Zhumadian power company on 2008-11-28<br>2. High-voltage Power Purchase and Sale Contract signed by Huaneng Zhongyuan Gas Power Plant and Henan Electric Power Company on 1 January 2009<br>3. Gas Purchase and Sale Contract signed by Henan Zhongyuan Gas Power Plant and Petrol China Company Ltd. on 18 May 2008, and the supplementary contract signed on 8 October 2009 |
| **/PWD/** | 1. Power Wiring Diagram<br>2. Gas pipeline connection Diagram |
| **/RTC/** | Project Responsibilities, Training and Competence Records:<br>1. Project Organization Chart and responsibilities<br>2. Staff Training Record 2011-11-05<br>3. Certificate of CDM training<br>4. Sample Copy of Operator Certificates |
| **/TP/** | Operation testing report for Gas turbine and Generator |
| **/SO/** | Statement of the outage during September and October in 2011 issued by Huaneng Zhongyuan Gas Power Plant on 2012-02-08 |
| **/SPD/** | Statement regarding power dispatched during April to July 2011 issued by Power Grid Company of Henan Province on 2012-02-08 |
| **/SU/** | Specification of ultrasonic meters |
| **/UPA/** | Ultrasonic meter Purchase agreement signed 2010-07-19 |

| Reference | Document |
|---|---|
| **/XLS/** | Emission Calculation sheets provided by the project participant (related to MR). |

**Table 7-2:** Background investigation and assessment documents

| Reference | Document |
|---|---|
| **/AM29/** | Approved CDM Methodology AM0029, version 03: "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" |
| **/CPM/** | TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms) |
| **/GLMP/** | Guidelines: Completing the monitoring report form (EB 75, Annex 7) |
| **/IPCC/** | 1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book<br>2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book |
| **/KP/** | Kyoto Protocol (1997) |
| **/MA/** | Decision 3/CMP. 1 (Marrakesh – Accords) |
| **/MRT/** | Monitoring Report Form (F-CDM-MR), Version 03.1 |
| **/PDD/** | Project Design Document for CDM project: '*Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China*' version 9, dated 2009-8-14 |
| **/PS/** | CDM Project Standard (Version 5.0) |
| **/VAL/** | Validation Report for CDM project "Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China" version 5, dated 2009-8-24 |
| **/VER/** | 1. Verification Report for CDM project "*Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China*" covering 1st monitoring period 2009-08-25 to 2010-02-28, dated 2010-06-07<br>2. Verification Report for CDM project "*Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China*" covering 2nd monitoring period 2010-03-01 to 2010-06-30, dated 2010-08-18<br>3. Verification Report for CDM project "*Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China*" covering 3rd monitoring period 2010-07-01 to 2010-11-30, dated 2011-01-14 |

| Reference | Document |
|---|---|
| | 4. Verification Report for CDM project "*Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China*" covering 4th monitoring period 2010-12-01 to 2011-03-31, dated 2011-08-24 |
| **/VVS/** | CDM Validation and Verification Standard (Version 05.0) |

**Table 7-3:** Websites used

| Reference | Link | Organisation |
|---|---|---|
| **/dna-HP/** | www.cdm.ccchina.gov.cn | DNA of China |
| **/dna-SP/** | http://www.energimyndighete n.se/en/ | DNA of Sweden |
| **/mep/** | http://www.zhb.gov.cn/ | Ministry of Environmental Protection of China |
| **/unfccc/** | http://cdm.unfccc.int | UNFCCC |
| **/ipcc/** | www.ipcc-nggip.iges.or.jp | IPCC publications |

**Table 7-4:** List of interviewed persons

| Reference | MoI[1] | | Name | Organisation / Function |
|---|---|---|---|---|
| **/IM01/** | V | ☒ Mr. ☐ Ms | Chen Zhiqiang | Huaneng Zhongyuan Gas Power Company Ltd / CDM Project Manager |
| **/IM01/** | V | ☒ Mr. ☐ Ms | Qu Ruibin | Huaneng Zhongyuan Gas Power Company Ltd / Power Generation Department, Recording staff |
| **/IM01/** | V | ☒ Mr. ☐ Ms | Liu Zhengwei | Huaneng Zhongyuan Gas Power Company Ltd / Power Generation Department, Metering Engineer |
| **/IM01/** | V | ☐ Mr. ☒ Ms | Liu Xuancai | Huaneng Zhongyuan Gas Power Company Ltd / Electricity Data Account |

| Reference | MoI[1] | | Name | Organisation / Function |
|---|---|---|---|---|
| **/IM02/** | V | ☐ Mr.<br>☒ Ms | Feng Haiying | Beijing MD Energy Technology Co., Ltd. |

1) Means of Interview: (**T**elephone, **E**-Mail, **V**isit)

# ANNEX

**A1:** Verification Protocol

**A2:** Statements of Competence of involved Personnel

# ANNEX 1: VERIFICATION PROTOCOL

**Table A-1:** GHG calculation procedures and management control testing / detailed audit testing of residual risk areas and random testing

| Identification of potential reporting risk | Identification, assessment and testing of management controls | Areas of residual risks | Additional verification testing | Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| **Raw data generation** | | | | |
| • Installation of measuring equipment<br>• Dysfunction of installed equipment<br>• Maloperation by operational personnel<br>• Downtimes of equipment<br>• Exchange of equipment<br>• Change of measurement equipment characteristic<br>• Insufficient accuracy<br>• Change of technology | • Installation of modern and state of the art equipment<br>• Process control automation<br>• Internal data review<br>• Regular visual inspect-ions of installed equip-ment<br>• Only skilled and trained personnel operates the relevant equipment<br>• Daily raw data checks<br>• Immediate exchange of dysfunctional equipment<br>• Stand-by duty is | • Inadequate installation / operation of the monitoring equipment<br>• Inadequate exchange of equipment<br>• Change of personnel<br>• Undetected measurement errors<br>• Inappropriateness of Management system procedures w.r.t. monitoring plan requirements (e.g. substitute value strategies)<br>• Non-application of management system procedures<br>• Insufficient accuracy<br>• Inappropriate QA/QC | • Site – visit<br>• Check of equipment<br>• Check of technical data sheets<br>• Check of suppliers information / guarantees<br>• Check of calibration records, if applicable<br>• Check of maintenance records<br>• Counter-check of raw data and commercial data<br>• Check of CDM management system<br>• Check of CDM related procedures | • **See Table A-2** |

| Identification of potential reporting risk | Identification, assessment and testing of management controls | Areas of residual risks | Additional verification testing | Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| • Accuracy of values supplied by Third Parties | organized<br>• Training<br>• Internal audit procedures<br>• Internal check of QA/QC measures of involved Third Parties | measures of Third Parties | • Application of CDM management system procedures<br>• Check of trainings<br>• Check of responsibilities<br>• Check of QA/QC documentation / evidences of involved Third Parties | |
| **Raw data collection and data aggregation** | | | | |
| • Wrong data transfer from raw data to daily and monthly aggregated reporting forms<br>• IT Systems<br>• Spread sheet programming<br>• Manual data transmission<br>• Data protection<br>• Responsibilities | • Cross-check of data<br>• Plausibility checks of various parameters.<br>• Appropriate archiving system<br>• Clear allocation of responsibilities<br>• Application of CDM Management system procedures<br>• Usage of standard software solutions | • Unintended usage of old data that has been revised<br>• Incomplete documentation<br>• Ex-post corrections of records<br>• Ambiguous sources of information<br>• Non-application of management system procedures<br>• Manual data transfer mistakes | • Check of data aggregation steps<br>• Counter-calculation<br>• Data integrity checks by means of graphical data analysis and calculation of specific performance figures<br>• Check of management system certification<br>• Check of data archiving system | • **See Table A-2** |

| Identification of potential reporting risk | Identification, assessment and testing of management controls | Areas of residual risks | Additional verification testing | Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| | (Spreadsheets)<br>• Limited access to IT systems<br>• Data protection procedures | • Unintended change of spread sheet programming or data base entries<br>• Problems caused by updating/upgrading or change of applied software | • Check of application of Management system procedures | |
| **Other calculation parameters** | | | | |
| • Emission factors, oxidation factors, coefficients | • The values and data sources applied are defined in the PDD and monitoring plan | • Unintended or intended Modification of calculation parameters<br>• Wrong application of values<br>• Misinterpretations of the applied methodology and/ or the PDD<br>• Missing update of applicable regulatory framework (e.g. IPCC values) | • Update-check of regulatory framework<br>• Countercheck of the applied MP in the MR against the methodology and the PDD | • **See Table A-2** |
| **Calculation Methods** | | | | |

| Identification of potential reporting risk | Identification, assessment and testing of management controls | Areas of residual risks | Additional verification testing | Conclusions and Areas Requiring Improvement (including *Forward Action Requests*) |
|---|---|---|---|---|
| • Applied formulae<br>• Miscalculation<br>• Mistakes in spread-sheet calculation | • Advanced calculation and reporting tools<br>• A CDM coordinator is in charge of the CDM related calculations<br>• Usage of tested / counterchecked Excel spreadsheets<br>• Involvement of external consultants | • The danger of miscal-culation can only be minimized. | • Countercheck on the basis of own calculation.<br>• Spread sheet walk-trough.<br>• Plausibility checks<br>• Check of plots | • **See Table A-2** |
| **Monitoring reporting** | | | | |
| • Data transfer to the author of the monitoring report<br>• Data transfer to the monitoring report<br>• Unintended use of outdated versions | • An experienced CDM consultant is responsible for monitoring reporting.<br>• CDM QMS procedures are defined | • The danger of data transfer mistakes can only be minimized<br>• Inappropriate application of QMS procedures | • Counter check with evidences provided.<br>• Audit of procedure application | • **See Table A-2** |

**Table A-2:** (Project specific) Periodic Verification Checklist

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| ***A. Description of the project activity*** | | | | |
| **A.1. Purpose and general description of the project activity**<br>***(EB 75, Annex 7, A.1)***<br>*Check if section A.1 of the MR includes the following:*<br>- *Purpose of the PA and the measures taken to reduce GHG emissions*<br>- *Brief description of the installed technology and equipment*<br>- *Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods etc.)*<br>- *Total emission reductions achieved in this monitoring period* | /MR/ | The verification team has checked section A.1 of the MR and confirms that the information provided is complete and correct with regards to the following:<br>☒ Purpose of the PA and the measures taken to reduce GHG emissions<br>☒ Brief description of the installed technology and equipments<br>☒ Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods etc<br>☒ Total emission reductions achieved in this monitoring period<br>In this context the following findings have been identified:<br>N/A | OK | OK |
| **A.2. Location of project activity**<br>***(EB 75, Annex 7, A.2)***<br>*Check if section A.2 of the MR reflects correctly the following:*<br>- *Host Party(ies)*<br>- *Region / State / Province etc.*<br>- *City / Town / Community etc.* | /MR/<br>/PDD/<br>/IM/<br>/UNFCCC/ | The verification team has checked section A.2 of the MR and confirms by means of comparison with the information given in the PDD and information gathered during the site visit that the information provided is complete and correct with regards to the following:<br>☒ Host Party(ies)<br>☒ Region / State / Province<br>☒ City / Town / Community | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| - *Physical / geographical location (e.g. Latitude and Longitude)* | | ☒ Physical / Geographical location<br>In this context the following findings have been identified:<br>N/A | | |
| **A.3. Parties and Project Participants**<br>***(EB 75, Annex 7, A.3)***<br>*Check if section A.3 of the MR includes the following:*<br>- *All PPs as displayed on the UNFCCC website*<br>- *A correctly filled table as per the MR template* | /MR/<br>/unfccc/ | The verification team has checked section A.3 of the MR as well as the UNFCCC website and confirms that:<br>☒ all PPs as displayed on the project related UNFCCC website are correctly listed<br>☒ the table as per the template MR has been correctly filled<br>In this context the following findings have been identified:<br>N/A | OK | OK |
| **A.4. Reference of applied methodology**<br>***(EB 75, Annex 7, A.4)***<br>*Check if section A.4 of the MR correctly describes / includes the following:*<br>- *Reference to the applicable version of the methodology*<br>- *Reference to the applicable version(s) of relevant methodological tools*<br>- *Relevant EB decisions, if applicable* | /MR/<br>/PDD/<br>/unfccc/ | The verification team has checked section A.4 of the MR and confirms by means of comparison with the information given in the PDD and displayed on the UNFCCC website that the information provided is complete and correct with regards to the following:<br>☒ Number, title and version of the applicable CDM Methodology<br>☒ Name and version of applicable CDM methodological tools<br>☒ Relevant EB decisions<br>In this context the following findings have been identified: | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| | | N/A | | |
| **A.5. Crediting period of project activity**<br>***(EB 75, Annex 7, A.5)***<br>*Check if section A.5 of the MR correctly includes the following:*<br>- *Start date of the crediting period. In this context please check, if applicable, whether post registration changes to the start date have been accepted by the EB.*<br>- *Length and type of the crediting period* | /MR/ /unfccc/ | The verification team has checked section A.5 of the MR and confirms by means of comparison with the information displayed on the UNFCCC website that the information provided is complete and correct with regards to the following:<br>☒ Start date of the crediting period.<br>☒ Type and length of the crediting period<br>In this context the following findings have been identified:<br>N/A | OK | OK |
| **A.6. Publication of the Monitoring Report**<br>***(VVS, § 207)***<br>*Check if the monitoring report has been made publicly available on the UNFCCC website before the verification commenced.*<br>*Check if comments have been received and if yes, how they have been addressed.* | /unfccc/ | The verification team has ensured and confirms by means of checking the respective project information on the UNFCCC website that:<br>☒ The draft monitoring report, as received from the project participants, has been made publicly available prior to the start of the verification activities.<br>☒ No comments have been received.<br>In this context the following findings have been identified:<br>N/A | OK | OK |
| **A.7. Compliance with standardized format of the Monitoring Report** | /MR/ /unfccc/ | The verification team has checked all sections of the MR and confirms by means of comparison with the MR template that: | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| ***(VVS, § 212 e)***<br>*Check (only) if the latest applicable MR template has been used. For compliance assessment with the MR guideline pl. refer to the respective MR sections.* | | ☒ the standardized MR template has been used<br>In this context the following findings have been identified:<br>N/A | | |
| ***B. Implementation of project activity*** | | | | |
| **B.1. Description of implemented registered project activity**<br>***(EB 75, Annex 7, B.1)***<br>*Check if section B.1 of the MR correctly describes / includes the following:*<br>- *Implementation status of the PA*<br>- *Detailed description of installed technology(ies) / technical processes and equipment applied*<br>- *Diagrams (where appropriate)* | /MR/<br>/PDD/<br>/PS/<br>/IM/ | The verification team has checked section B.1 of the MR and confirms by means of comparison with the information given in the PDD, the project standard and information gathered during the site visit that:<br>☒ the description of the implementation status of the PA is in line with the applicable provisions of the project standard<br>☒ an appropriate description of the installed technology(ies), technical process and equipment incl.diagrams, where applicable, has been included<br>In this context the following findings have been identified:<br>N/A | OK | OK |
| **B.1.1. Initial project implementation**<br>***(VVS; § 225 a, 226)***<br>*Assess whether the project has been implemented and operated as per the registered PDD and are all physical features of the project in place?*<br>*Further focus on the potential phase wise implementation and check the reporting on the corresponding status and starting dates accordingly.* | /IM01/<br>/PDD/ | *Description:*<br>This is 5th periodic verification.<br>*Verifier´s action:*<br>The UNFCCC website has been checked.<br>*Conclusion:*<br>This is 5th periodic verification. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *Check if the project is still in compliance with the applicability conditions of the methodology.*<br>*Also, discuss – if applicable – the necessity of PRC notifications / approvals.* | | | | |
| **B.1.2. Technical equipment changes**<br>***(VVS; § 225 a, 226)***<br>*Check if relevant technical equipment of the project activity has been exchanged or modified during the monitoring period. Further ensure that consistent notations of key equipment (meters etc.) in PDD, MR and calculation spreadsheet are applied*<br>*Consider e.g. interviews with operational personnel, QMS records, maintenance records, instrument specifications.*<br>*In case of changes, check whether the project is still in line with the registered PDD and assure that these changes have been considered in the monitoring report and the emission reduction calculation.*<br>*In case of post registration changes pl. refer to chapter B.2.* | /IM01/ /TP/ /PDD/ /PHT/ /LOG/ | *Description:*<br>The technical equipment incl. type and capacity of gas, steam turbines and generators, measurement instruments, transformers etc. have not been changed and are consistent with those in registered PDD. The key equipments w.r.t monitoring plan in PDD had been checked.<br>*Verifier´s action:*<br>By means of instrument specifications check and the interview during the on-site visit. This was also crosschecked as per the plant operation log, equipments check & maintenance log and on-site observation.<br>*Conclusion:*<br>No technical equipment w.r.t power generation was exchanged or modified within the monitoring period. | OK | OK |
| **B.1.3. Operation of the project activity**<br>***(VVS; § 225 a, 226)***<br>*Check if relevant operation modes of the project activity have been exchanged or modified during the monitoring period.* | /IM01/ /LOG/ /O&M/ /PHT/ | *Description:*<br>The operation modes such as electricity generating, electricity measurement, gas consumption etc. have not been changed.<br>*Verifier´s action:*<br>By means of interviews with the operational personnel, | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *Consider e.g. interviews with operational personnel, operation log sheets, data management system records.*<br>*In case of changes, check whether the project is still in line with the registered PDD and assure that these changes have been considered in the monitoring report and the emission reduction calculation.*<br>*In case of post registration changes pl. refer to chapter B.2.* | | crosschecked with the plant operation log, equipments check & maintenance log and on-site observation.<br>*Conclusion:*<br>No relevant operation modes were exchanged within the monitoring period. | | |
| **B.1.4. Incidents**<br>***(VVS; § 225 a, 226)***<br>*Identify if there have been any significant incidents, deviant operation modes and / or downtimes of the equipment?*<br>*Consider e.g. interviews with operational personnel, operational log sheets, analysis of performance data.* | /IM01/<br>/LOG/<br>/O&M/<br>/PHT/<br>/IAR/ | *Description:*<br>No significant incidents deviant operation modes and / or downtimes of the equipment have occurred.<br>*Verifier´s action:*<br>Through the site observation, the plant operation log check, equipments check & maintenance log audit, interviews with the plant operators. This was also backed up by the data integrity check.<br>*Conclusion:*<br>Incidents during the monitoring period have not been observed. | OK | OK |
| **B.1.5. Legislation**<br>Find out – esp. in the context of methodological requirements - whether relevant legislation with effect on the project activity in the host country has been changed.<br>Assess, in case of changes, whether consequences for the PA with regard to relevant CDM requirements | /IM01/<br>/dna/<br>/mep/ | *Description:*<br>Relevant legislation incl. electricity generation and transmission, gas consumption related environmental protection laws, sectoral policies and relevant regulations were not changed.<br>*Verifier´s action:*<br>It was verified through consulting official governmental website and as per the local and sectoral expertise of the verification team. | OK | OK |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| have been accounted for.<br>In case of changes data sources shall be referenced. | | *Conclusion:*<br>No relevant changes since the validation were identified. | | |
| **B.1.6. Open issues from validation** ***(VVS; § 213)***<br>*Check (esp. in case of 1st periodic verification) whether there are any open issues indicated in the validation report (e.g. FAR)?* | /VAL/ | ☒ There were no open issues addressed in the validation report<br>☐ All open issues from the validation have been appropriately addressed.<br>☐ The following issues related to the validation have not yet been appropriately addressed: | OK | OK |
| **B.1.7. Open issues from previous verification** ***(VVS; §§ 213; 284 h)***<br>*Check in case of further periodic verifications whether there are any open issues indicated in previous verification reports (FAR) and take into consideration the guidance as specified in VVS.* | /VER/ | ☒ There were no open issues addressed in the previous verification report<br>☐ All open issues from the previous verification have been appropriately addressed.<br>☐ The following issues related to the previous verification have not yet been appropriately addressed: | OK | OK |
| **B.2. Post registration changes** | | | | |
| **B.2.1. Are post registration changes applicable to the proposed project activity?** | /PDD/ /MR/ | ☒ No, by means of site visit, document check and interview it could be verified that the project is implemented and operated in line with the registered PDD and the applied methodology. (Please proceed | OK | OK |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| | | with section C)<br>☐ Yes, post registration changes have been identified and are assessed in detail in the subsequent steps. (Please proceed with B.2.2.) | | |
| **B.2.2. Temporary deviations from the registered monitoring plan or applied methodology (TDfrMP; TDfMM)**<br>***(EB 75, Annex 7, B.2.1; VVS §§ 251 - 256)***<br>*Indicate whether any temporary deviations have been applied during this monitoring period.*<br>*In cases where approval has been sought from the EB please provide reference.*<br>*If applied, provide a description of the deviation(s).*<br>*This should include the reasons for the deviation(s), how it deviates from the monitoring plan and/or applied methodology(ies), the duration for which the deviation(s) is(are) applicable and justification on the conservativeness of the approach. Indicate if the deviation will lead to a reduction in the accuracy and if so, which conservative assumptions and discount factors have been applied.*<br>*For deviation(s) that require prior approval by the Board, include the date of approval and reference number.* | /PS/ /unfccc/ | ☒ No TDfrMP or TDfMM.have been submitted to the UNFCCC prior to the current monitoring period<br>☐ The following TDfrMP or TDfMM have been approved or are under approval by the UNFCCC<br>1 Title<br>Status ☐ under approval; ☐ approved<br>Appr.date<br>Ref. No.<br>2 Title<br>Status ☐ under approval; ☐ approved<br>Appr.date<br>Ref.No.<br>☒ During the verification of the current MP no need for a TDfrMP or TDfMM has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA<br>☐ An approval of the following TDfrMP or TDfMM is to be requested from the EB for the current MP as appendix 1 | OK | OK |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| | | of the project standard does not apply.<br>1 Issue:<br>2 Issue:<br>☐ The following TDfrMP or TDfMM for which appendix 1 of the PS is applicable have been applied:<br>1 Issue:<br>2 Issue:<br><br>*In cases of approved TDfrMP or TDfM the EB guidance has been applied as follows:*<br><br>*Detailed description and justification each TDfrMP or TDfM for which appendix 1 is applicable:*<br><br>In this context the following findings have been identified:<br>N/A | | |
| **B.2.3. Corrections**<br>***(EB 75, Annex 7, B.2.2; VVS; §§ 257 - 259)***<br>*Indicate whether any corrections to project* | /PS/ /unfccc/ | ☒ During the verification of the current MP no need for corrections has been identified. | OK | OK |

| **Checklist Item** (incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments** (Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report.*<br>*In cases where the correction(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD.*<br>*Please check and report that the corrected information is an accurate reflection of the actual project information and that the corrected parameters are in accordance with the applied methodology and the monitoring plan.* | | ☐ The following corrections have been applied:<br>1 Issue:<br>2 Issue:<br>*Detailed description and justification each correction:*<br>In this context the following findings have been identified:<br>N/A | | |
| **B.2.4. Permanent changes from the registered monitoring plan or applied methodology (PCfrMP; PCfMM)**<br>***(EB 75, Annex 7, B.2.3; VVS; §§ 262 - 268)***<br>*Indicate whether any permanent changes from the registered monitoring plan or applied methodologies have been approved during this monitoring period or submitted with this monitoring report.*<br>*In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise,* | /PS/ /unfccc/ | ☒ No PCfrMP or PCfMM.have been submitted to the UNFCCC prior to the current monitoring period<br>☐ The following PCfrMP or PCfMM have been approved or are under approval by the UNFCCC<br>1 Title<br>Status ☐ under approval; ☐ approved<br>Appr.date<br>Ref. No.<br>2 Title | OK | OK |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| *provide the version number and the completion date of the revised PDD.* | | Status: ☐ under approval; ☐ approved<br>Appr.date:<br>Ref.No.<br>☒ During the verification of the current MP no need for a PCfrMP or PCfMM has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA<br>☐ An approval of the following PCfrMP or PCfMM is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.<br>1 Issue:<br>2 Issue:<br>☐ The following PCfrMP or PCfMM for which appendix 1 of the PS is applicable have been applied:<br>1 Issue:<br>2 Issue:<br>*In cases of approved* PCfrMP or PCfMM *the EB guidance has been applied as follows:*<br>*Detailed description and justification each TDfrMP or TDfM for which appendix 1 is applicable:* | | |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| | | In this context the following findings have been identified:<br>N/A | | |
| **B.2.5. Changes to the project design of the registered project activity (CoPD)**<br>***(EB 75, Annex 7, B.2.4; VVS; §§ 269 - 282)***<br>*Indicate whether any changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report.*<br>*In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD.* | /PS/ /unfccc/ | ☒ No CoPD has been submitted to the UNFCCC prior to the current monitoring period<br>☐ The following CoPD has been approved or are under approval by the UNFCCC<br>1 Title<br>Status ☐ under approval; ☐ approved<br>Appr.date<br>Ref. No.<br>2 Title<br>Status ☐ under approval; ☐ approved<br>Appr.date<br>Ref.No.<br>☒ During the verification of the current MP no need for a CoPD has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA | OK | OK |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| | | ☐ An approval of the following CoPD.is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.<br>1 Issue:<br>2 Issue:<br>☐ The following CoPD for which appendix 1 of the PS is applicable have been applied:<br>1 Issue:<br>2 Issue:<br>*In cases of approved CoPD the EB guidance has been applied as follows:*<br>*Detailed description and justification each CoPD for which appendix 1 of the CDM Project Standard is applicable:*<br>In this context the following findings have been identified:<br>N/A | | |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| ***C. Description of monitoring system*** | | | | |
| **C.1. Monitoring Plan – PDD Compliance** ***(VVS, §§ 233-236)***<br>*Check if the monitoring plan is in accordance with the monitoring plan contained in the registered PDD (or any accepted revised MP).*<br>*Please check esp. if*<br>- *all parameters stated in the MP of the registered PDD have been monitored and updated as applicable*<br>- *the monitoring equipment has been controlled and calibrated as per the MP*<br>- *the monitoring results are consistently recorded as per the approved frequency*<br>- *QA/QC procedures have been applied in accordance with the MP* | /MR/ /PDD/ | By means of comparison of the MR with the registered PDD (or any revisions thereof) the verification team has checked whether the MP is in compliance with the registered PDD. The outcome is as follows:<br>☒ The MP is completely in accordance with the last registered/approved version of the PDD / MP.<br>In this context the following findings have been identified:<br>N/A | OK | OK |
| **C.2. Monitoring Plan – Meth Compliance** ***(VVS, §§ 229-232)***<br>*Check if the monitoring plan is in accordance with the applied methodology.*<br>*In case the methodology references applicable tools it has to be ensured that the MP is also compliant with those tools.*<br>*Also please specify if monitoring aspects have been* | /MR/ /PDD/ /ACM2/ | By means of comparison of the MR with the applied CDM methodology and related tools the verification team has checked whether the MP is in compliance with the MP related requirements of the applied methodology. The outcome is as follows:<br>☒ The MP is completely in accordance with the approved methodology applied by the CDM project (last registered/approved version of the PDD) | OK | OK |

<table>
<tr><th>Checklist Item<br>(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments<br>(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>identified that are not specified in the methodology but may enhance the level of accuracy and completeness of the monitoring plan – this esp. applies for SSC PAs.</td><td></td><td>☒ The MP is completely in accordance with the applied tools which the methodology references. A breakdown of the referenced tools is as follows:<br><table><tr><td>1</td><td>Title (of the tool)</td><td>Tool to Calculate the Emission Factor for an Electricity System</td></tr><tr><td></td><td>Version</td><td>1</td></tr><tr><td></td><td>MP compliance</td><td>☐ full compliance<br>☐ findings have been raised<br>☒ N/A (for MP)</td></tr></table>In this context the following findings have been identified:<br><br>Regarding aspects that are not specified in the methodology the following issues have been identified which may enhance the level of accuracy and completeness of the MP:<br>N/A</td><td></td><td></td></tr>
<tr><td>C.3. Management System<br>(VVS, § 217 (a) (iii))<br>Check if the GHG data monitoring system can be assessed as appropriate.<br>In case reference is made to a (certified) company quality management system, check if all CDM related monitoring procedures have been fully integrated in</td><td>/QA/<br>/IM01/<br>/IM02/<br>/MM/</td><td>Description:<br>The MR includes metering diagram with all relevant monitoring points, and the diagram reflects the actual situation and is in line with registered PDD and the applied methodology.<br>Verifier´s action:<br>The MR has been verified against on-site observation and interview with project operators.</td><td>OK</td><td>OK</td></tr>
</table>

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *the project participant's quality management system.*<br>*In case of a stand-alone system, check how the GHG management system has been implemented and effectiveness is ensured.* | | *Conclusion:*<br>*The metering diagram correctly reflects the real situation.* | | |
| **C.4. Metering diagram**<br>***(EB 75, Annex 7, C; PS §196)***<br>*Check first if the MR includes a metering diagram showing all relevant monitoring points.*<br>*Check further if this diagram reflects the actual situation and is in line with the registered PDD and with the requirements of the applied methodology.* | /MR/<br>/IM01/ | *Description:*<br>The MR includes metering diagram with all relevant monitoring points, and the diagram reflects the actual situation and is in line with registered PDD and the applied methodology.<br>*Verifier´s action:*<br>The MR has been verified against on-site observation and interview with project operators.<br>*Conclusion:*<br>The metering diagram correctly reflects the real situation. | OK | OK |
| **C.5. Roles and Responsibilities**<br>***(EB 75, Annex 7, C; PS §196)***<br>*Check if all roles and positions of each person in the GHG data management process are clearly defined and implemented as stated in the monitoring plan. Please consider the complete data trail from raw data generation to submission of the final data.*<br>*Identify, if relevant personnel w.r.t. monitoring has been exchanged?*<br>*If so, have appropriate training measures been carried out.* | /IM01/<br>/QA/<br>/MM/<br>/RTC/ | *Description:*<br>Responsibilities for measurements, collection and compilation of data, data storage and archiving, calibration, maintenance and training of personnel have been introduced.<br>*Verifier´s action:*<br>The certificates of the appointed person have been checked.<br>*Conclusion:*<br>All appointed persons involved are duly qualified for the task assigned. The roles and positions of each person have been clearly defined and implemented. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *In case of changes, assure that the implemented monitoring procedures have not been affected.* | | | | |
| **C.6. Emergency procedures for the monitor-ing system**<br>***(EB 75 Annex 7, C; PS §196)***<br>*Check, as appropriate, whether relevant emergency procedures for the monitoring system have been included in the MR and assess whether these procedures have been implemented, when required* | /QA/ /IM01/ /LOG/ /O&M/ | *Description:*<br>*Emergency procedures for CDM purposes are in this case considered as essential part of ordinary plant operations.*<br>*Verifier´s action:*<br>*The project operation records have been checked and responsible stuff has been interviewed.*<br>*Conclusion:*<br>*Emergency procedures are implemented.* | OK | OK |
| **C.7. Data archive and data protection**<br>***(PS §56 b)***<br>Check whether all records of monitoring parameters are archived according to the monitoring plan.<br>Assess further whether appropriate measures have been taken in order to avoid unintended or intended manipulation or loss of the measured data. | /QA/ /IM01/ | *Description:*<br>All relevant monitoring data was available and procedures are in place so that relevant monitoring data will be retained at least 2 years after the end of the current crediting period.<br>The danger of unintended or intended data manipulation can be considered as low, since:<br>1. The meters were verified and sealed by the grid company; the measured data will be cross checked by the monthly invoices.<br>2. On-line monitoring system retrieves data from the meters to the data assembly point and recorded.<br>3. All data stored on-site are archived in forms of hardcopy and softcopy. The monitoring section is responsible for records control. The corresponding IT-Systems work within limitation of user authorisation. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| | | *Verifier´s action:*<br>The records of the monitoring data and the hard & soft copy have been checked.<br>The operational daily log, daily and monthly electricity record, monthly invoices and electricity transaction notes are checked.<br>*Conclusion:*<br>The data is assessed to be appropriate. All data has been archived according to monitoring plan.<br>The measures taken by the project owner and grid company could ensure the data well to be protected and frozen. | | |
| ***D. Data and parameters*** | | | | |
| **D.1. Data and Parameters fixed ex ante** | | | | |
| ***a) Compliance with registered PDD***<br>***(EB 75 Annex 7; D1, VVS § 246 (d))***<br>*Check whether the value applied is in compliance with the registered PDD.* | /PDD/<br>/MR/<br>/MI01/ | *Description:*<br>The parameters fixed ex ante have been listed in MR.<br>*Verifier´s action:*<br>The MR, monitoring plan and PDD have been checked.<br>*Conclusion:*<br>The value applied is in compliance with the registered PDD. | OK | OK |

| Checklist Item (incl. guidance for the verification team) | Refe-rence | Verification Team Comments (Means and results of assessment) | Draft Concl. | Final Concl. |
|---|---|---|---|---|
| ***b) Compliance with the applied methodology*** ***(EB 75 Annex 7; D1)*** *Check whether the value applied is in compliance with the applied methodology or any other tool.* | /PDD/ /MR/ /MI01/ | *Description:* The parameters fixed ex ante have been listed in MR. *Verifier´s action:* The MR, monitoring plan and PDD have been checked. *Conclusion:* The value applied is in compliance with the applied methodology or any other tool. | OK | OK |
| **D.2. Data and Parameters monitored** | | | | |
| **D.2.1. $FC_{NG,y}$** | | **Description:** Quantity of natural gas consumed in project activity | | |
| ***a) Measurement / Determination method*** ***(VVS, §§ 233, 236)*** *Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).* *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* *Assess whether the measurement / determination method is in line with the registered monitoring plan* | /IM01/ /PDD/ /AM29/ /DMR/ /MMR/ /INO/ | *Description:* $FC_{NG,y}$ is determined as annual quantity of natural gas consumed in project activity. The natural gas consumed in project activity was measured continuously by the Gas Flow Meter No.1 and Meter No.2 with accuracy 1.0 and recorded daily, one of which is for backup. The meters are located in front of the natural gas delivery point. No meters exchanges and malfunction were detected during the monitoring period. *Verifier´s action:* The daily and monthly meter reading records have been checked and cross checked by the monthly gas purchasing invoices. The real meters have been viewed and cross checked with the meter calibration report. | ~~CL D1~~ | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *of the PDD and the applied methodology.* | | *Conclusion:*<br>The characteristics of the meters including serial number, type, and accuracy of the meter are consistent with those described in validated MP.<br>No failures / downtimes of standard equipment were observed during the monitoring period, thus no deviant measurement / determination methods were applied. The measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.<br>CL D1 was raised. | | |
| ***b) Accuracy and QA/QC Procedure***<br>***(VVS, §§ 237-243)***<br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | /CAL2/ /MM/ | *Description:*<br>The natural gas consumed in the project was measured by the Gas Flow Meter No.1 and Meter No.2 continuously with accuracy 1.0 and recorded daily.<br>The main meter calibrations were performed yearly by a qualified third party and in line with the industry requirement.<br>*Verifier´s action:*<br>The accuracy of meter No.1 and No.2 is 1.0 and meets the applied national standard (GB/T 18603-2001). The measured value was crosschecked by the monthly NG purchasing invoices. The meters calibration records regarding the main meter and the backup meter covering the monitoring period were checked during the verification.<br>*Conclusion:*<br>All the meters are in normal operational condition during this monitoring period. No inaccuracies occurred during the monitoring period. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| ***c) Correctness***<br>***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /MR/ /DMR/ /MMR/ /INO/ /XLS/ | ☒ Correct ☐ Not correct (initial assessment)<br>*Description:*<br>The natural gas consumed in the project is measured by Gas Flow Meter No.1 and Gas Flow Meter No.2 from 2011-04-01 to 2011-11-30 was provided in MR. Natural gas purchasing invoices were available for the verification team.<br>*Verifier´s action:*<br>The daily and monthly meter reading records were checked and compared with natural gas purchasing invoices and meter reading records of backup meter.<br>*Conclusion:*<br>The value of natural gas consumed in the project is correct. | OK | OK |
| **D.2.2. $NCV_{NG,y}$** | | **Description:** Net Calorific Value of the NG | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* | /IM01/ /PDD/ /AM29/ /DMR/ /MMR/ /INO/ | *Description:*<br>The NCV of the natural gas is determined from the results of a gas-phase chromatograph (GC) measurement upstream of the plant. The value is measured by the gas supplier (Petro China Company Ltd.) and the NCV values were recorded every ten days and submitted by the gas supplier.<br>The GC on site is manufactured by ABB, Type BTU-8000. This GC is operated on a continuous basis.<br>No device exchanges and malfunction were detected during the monitoring period.<br>*Verifier´s action:*<br>The accuracy of GS was checked against the GS calibration report. The characteristics including measuring conditions and | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.* | | accuracy of the meter are consistent with those described in validated MP.<br>*Conclusion:*<br>No failures / downtimes of standard equipment were observed during the monitoring period, thus no deviant measurement / determination methods were applied. The measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology. | | |
| ***b) Accuracy and QA/QC Procedure***<br>***(VVS, §§ 237-243)***<br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | /CAL3/<br>/MM/ | *Description:*<br>The NCV value in the project was measured by GC continuously The GC calibrations were performed yearly by a qualified third party and they are in line with the industry requirement.<br>*Verifier´s action:*<br>The accuracy of GC met with the applied national standard (GB/T13610-2003). The GC calibration records covering the monitoring period were available during the onsite visit and have been checked.<br>*Conclusion:*<br>No significant inaccuracies have been identified for this parameter. | OK | OK |
| ***c) Correctness***<br>***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* | /MR/<br>/DMR/<br>/MMR/<br>/INO/<br>/XLS/ | ☒ Correct ☐ Not correct (initial assessment)<br>*Description:*<br>The NCV value is measured by a gas-phase chromatograph from 2011-04-01 to 2011-11-30 as provided in MR.<br>*Verifier´s action:* | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | | The NCV reading records provided by the gas supplier has been reviewed. The value given in the monitoring report and the corresponding Excel sheet were checked.<br>*Conclusion:*<br>The value of NCV applied in the project is correct. | | |
| **D.2.3. $OXID_i$** | | **Description:** Oxidation factor for the fuel i | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.*<br>*Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.* | /PDD/ /AM29/ /ipcc/ | *Description:*<br>The oxidation factor has to be derived from the latest IPCC values.<br>*Verifier´s action:*<br>The latest 2006 IPPC values have been checked.<br>*Conclusion:*<br>The measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology. | OK | OK |
| ***b) Accuracy and QA/QC Procedure***<br>***(VVS, §§ 237-243)***<br>*In case of measured (or estimated) values, check* | /ipcc/ /MM/ | *Description:*<br>N/A<br>*Verifier´s action:* | N/A | N/A |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | | N/A<br>*Conclusion:*<br>N/A | | |
| ***c) Correctness***<br>***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /MR/ /ipcc/ /XLS/ | ☒ Correct ☐ Not correct (initial assessment)<br>*Description:*<br>The 2006 value for OXIDi (i.e. 1.0) has been used.<br>*Verifier´s action:*<br>The latest 2006 IPPC values have been checked though the IPCC official website.<br>*Conclusion:*<br>The value given in the monitoring report is assessed to be reliable and correct. | OK | OK |
| **D.2.4. $EF_{CO2,NG,y}$** | | **Description:** Emission factor for NG consumed in the project activity | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was* | /IM01/ /PDD/ /AM29/ /ipcc/ | *Description:*<br>The value is determined by National data which is cited from 2006 IPCC Guidelines | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.*<br>*Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.* | | *Verifier´s action:*<br>The National and IPCC data has been checked.<br>*Conclusion:*<br>The measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology. | | |
| ***b) Accuracy and QA/QC Procedure***<br>***(VVS, §§ 237-243)***<br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | /CAL2/<br>/MM/ | *Description:*<br>N/A<br>*Verifier´s action:*<br>N/A<br>*Conclusion:*<br>N/A | N/A | N/A |
| ***c) Correctness*** | /MR/<br>/DMR/ | ☒ Correct ☐ Not correct (initial assessment) | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| ***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /MMR/ /INO/ /XLS/ /ipcc/ | *Description:*<br>The IPCC 2006 value for $EF_{CO2,NG,y}$ (0.0561 $tCO_2/GJ$) has been used. The default carbon content if NG is 15.3 (kg/GJ).<br>*Verifier´s action:*<br>The latest 2006 IPPC values have been checked though the IPCC official website, which is assessed to be reliable.<br>*Conclusion:*<br>The value given in the monitoring report is correct. | | |
| **D.2.5. $COEF_{NG,y}$** | | **Description:** $CO_2$ emission coefficient in year y for natural gas. | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.*<br>*Assess whether the measurement / determination method is in line with the registered monitoring plan* | /IM01/ /PDD/ /AM29/ /DMR/ /MMR/ /INO/ | *Description:*<br>$COEF_{NG,y} = NCV_{NG,y} \times EF_{CO2,NG,y} \times OXID_{NG}$.<br>The coefficient is the product from the monitored values net calorific value, emission factor and oxidation,<br>*Verifier´s action:*<br>The methodology and the registered PDD have been checked to confirm the correctness.<br>*Conclusion:*<br>The measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *of the PDD and the applied methodology.* | | | | |
| ***b) Accuracy and QA/QC Procedure***<br>***(VVS, §§ 237-243)***<br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | /CAL1-3/ /MM/ | *Description:*<br>As per the methodology QA/QC procedures are not necessary.<br>*Verifier´s action:*<br>N/A<br>*Conclusion:*<br>N/A | N/A | |
| ***c) Correctness***<br>***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /MR/ /DMR/ /MMR/ /INO/ /XLS/ | ☒ Correct ☐ Not correct (initial assessment)<br>*Description:*<br>The parameters applied for the calculation were verified in the above tables, which are assessed as correct.<br>*Verifier´s action:*<br>The latest 2006 IPCC values have been checked though the IPCC official website. The NCV reading records provided by the gas supplier were checked. The value given in the monitoring report and the corresponding Excel sheet were checked.<br>*Conclusion:*<br>The value given in the monitoring report is correct. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| **D.2.6. $PE_y$** | | **Description:** $CO_2$ emissions from the power plant of the project due to combustion of natural gas fuel in y year. | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.*<br>*Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.* | /IM01/ /PDD/ /AM29/ /DMR/ /MMR/ /INO/ | *Description:*<br>$PE_y = FC_{NG,y} \times COEF_{NG,y}$<br>$COEF_{NG,y} = NCV_{NG,y} \times EF_{CO2,NG,y} \times OXID_{NG}$.<br>The project emission is total volume of natural gas consumed multiplied the coefficient above.<br>*Verifier´s action:*<br>The methodology and the registered PDD have been checked to confirm the correctness.<br>*Conclusion:*<br>The measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology. | OK | OK |
| ***b) Accuracy and QA/QC Procedure***<br>***(VVS, §§ 237-243)***<br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* | /CAL/ /MM/ | *Description:*<br>N/A<br>*Verifier´s action:*<br>N/A<br>*Conclusion:*<br>N/A | N/A | N/A |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | | | | |
| ***c) Correctness***<br>***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /MR/<br>/DMR/<br>/MMR/<br>/INO/<br>/XLS/ | ☒ Correct ☐ Not correct (initial assessment)<br>The parameters applied for the calculation were verified in the above tables, which are assessed as correct.<br>*Verifier´s action:*<br>The gas consumption and NCV have been checked though the record data. The NCV reading records provided by the gas supplier were checked. The value given in the monitoring report and the corresponding Excel sheet were checked.<br>*Conclusion:*<br>The value given in the monitoring report is correct. | OK | OK |
| **D.2.7. $EG_{net,pj,y}$** | | **Description:** The actual annual net electricity delivered by the project activity | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard* | /IM01/<br>/PDD/<br>/AM29/<br>/DMR/<br>/MMR/<br>/INO/ | *Description:*<br>Three meters are involved in metering of the electricity exported to the grid and imported from the grid. All meters are listed in Table 5-1. The Meter No.1 and Meter No.2 are located at 500kV main substation. The bidirectional meters are set up, one is the primary meter and another is the backup one. In case the meter No.1 is detected in fault, the backup meter No.2 will replace the No.1 for billing. During this monitoring period, there is no malfunction detected in meter No.1, therefore meter No.1 is used as invoice meter and meter No.2 is a back-up meter. | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.*<br><br>*Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.* | | Neither meter no. 1 nor meter no. 2 have been exchanged.<br><br>Meter No.3 is located at project site on 110kV line, which is used to measure the amount of electricity imported from the grid in case the electricity is needed for starting up the power units.<br><br>Nevertheless regular manual readings are taken. They are the basis for the invoice which is raised on a monthly basis to the grid company.<br><br>*Verifier´s action:*<br><br>The daily and monthly meter reading records were checked by the verification team and cross checked by the monthly gas purchasing invoices.<br><br>*Conclusion:*<br><br>The measurement method of Meter No.1 and Meter No.2 is in line with the registered monitoring plan of PDD and applied methodology AM0029, Ver.03. | | |
| ***b) Accuracy and QA/QC Procedure***<br><br>***(VVS, §§ 237-243)***<br><br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br><br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line* | /CAL1/<br>/MM/ | *Description:*<br><br>The exported and imported electricity were measured by Meter No.1, Meter No.2 and Meter No.3 continuously with accuracy 0.2S and recorded monthly.<br><br>All the main meters and the backup meters calibrations were performed quarterly by a qualified third party and in line with the industry requirement.<br><br>*Verifier´s action:*<br><br>The accuracy of Meter No.1, Meter No.2 and Meter No.3 is 0.2S meet the applied national standard (DL/T 448 2000). The measured value was crosschecked by the monthly power sales | ~~CL D2~~ | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *with the latest EB guidance.* | | and purchasing invoices.<br>The meters calibration records covering the monitoring period were available during the onsite verification and have been checked.<br>*Conclusion:*<br>All the meters are in normal operational condition during this monitoring period. No inaccuracies occurred during the monitoring period for Meter No.1, Meter No.2 and Meter No.3. However, CL D2 was raised. | | |
| ***c) Correctness***<br>***(VVS, §§ 233, 236)***<br>*Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /MR/<br>/DMR/<br>/MMR/<br>/INO/<br>/XLS/ | ☒ Correct ☐ Not correct (initial assessment)<br>*Description:*<br>The electricity supplied to the grid and imported from grid was correct.<br>*Verifier´s action:*<br>The daily and monthly meter reading records were checked and compared with the electricity invoices and power balance sheet which were approved by grid company.<br>*Conclusion:*<br>However, CL D2 was raised. | ~~CL D2~~ | OK |
| **D.2.8. $EF_{grid,BM,y}$** | | **Description:** Build marginal emission factor of the CCPG during the project operation period | | |
| ***a) Measurement / Determination method***<br>***(VVS, §§ 233, 236)***<br>*Describe how the monitoring parameter was measured / determined. Focus primarily on the* | /PDD/<br>/AM29/<br>/dna-HP/ | *Description:*<br>As per the PDD, $EF_{grid,BM,y}$ is selected as the baseline emission factor, which has been determined ex post. For the verification, the latest value available at the DNA website at the time of | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).*<br><br>*Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.*<br><br>*Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.* | | verification was used.<br><br>*Verifier´s action:*<br>The latest value available at the DNA website (2010 baseline emission factors for regional power grids in China issued by China's DNA on 20/10/2011) has been checked.<br>*Conclusion:*<br>The measurement and determination method are assessed as correct. | | |
| ***b) Accuracy and QA/QC Procedure***<br><br>***(VVS, §§ 237-243)***<br><br>*In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*<br><br>*Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* | /dna-HP/ | *Description:*<br>N/A<br><br>*Verifier´s action:*<br>N/A<br>*Conclusion:*<br>N/A | N/A | N/A |
| ***c) Correctness***<br><br>***(VVS, §§ 233, 236)*** | /MR/<br>/DMR/<br>/MMR/ | ☒ Correct ☐ Not correct (initial assessment)<br>*Description:* | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*<br>*In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*<br>*In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.* | /INO/ /XLS/ /dna-HP/ | The latest value available at the DNA is 0.4191<br>*Verifier´s action:*<br>The latest value available at the DNA website (2010 baseline emission factors for regional power grids in China issued by China's DNA on 20/10/2011) has been checked.<br>*Conclusion:*<br>The value given in the monitoring report is correct. | | |
| ***D.3. Sampling*** | | | | |
| ***a) Implementation of sampling plan***<br>***(EB75 Annex 7; D3)***<br>*Check whether the PP has applied a sampling approach to determine the monitored values (as per section D.2 above).*<br>*If this is the case, please provide an assessment whether the PPs have correctly and sufficiently described the implemented sampling plan including*<br>*a) Description of the implemented sampling design*<br>*b) Collected data*<br>*c) Analysis of collected data*<br>*d) Demonstration on whether the required confidence/precision has been met.* | /PDD/ /MR/ /MI01/ | ☒ No sampling approach has been used by the PP to determine the monitored parameters<br>**OR**.<br>☐ A sampling approach has been taken for the following monitored parameter: | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| ***b) Sampling during verification***<br>*In case the VT has applied a sampling approach in the course of the verification the approach shall be described for each parameter.* | /PDD/ /MR/ /MI01/ | ☒ No sampling approach has been used by the VT to verify the monitored parameters<br>**OR**.<br>☐ A sampling approach has been applied by the VT for the following monitored parameter: | OK | OK |
| ***E. Calculation of Emission reductions*** | | | | |
| **E.1. Traceability**<br>***(VVS, §§ 212, 214)***<br>*Assess if the calculation is fully traceable. In case of complex calculations an Excel calculation spread-sheet shall be used. All applied formulae must be visible.* | /XLS/ | *Description:*<br>*Description:*<br>An unprotected Excel calculation sheet has been provided.<br>*Verifier´s action:*<br>The calculation spreadsheet has been checked.<br>*Conclusion:*<br>All applied formulae are visible. | OK | OK |
| **E.2. Parameter consistency**<br>***(VVS, § 214)***<br>*Assess whether all internal and external parameters and data used for calculation are applied consistently in the monitoring report and the calculation spreadsheet?*<br>*Consider only the correct data exchange between the monitoring report and the calculation spreadsheet (if* | /XLS/ | *Description:*<br>All the internal and external parameters and data used for calculation are applied consistently in the monitoring report and the calculation spreadsheet<br>*Verifier´s action:*<br>The Excel – calculation sheet has been checked.<br>*Conclusion:*<br>The Excel – calculation sheet is completely in line with the MR. | OK | OK |

| **Checklist Item** (incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments** (Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *any). Further ensure the consistency of notations for all parameters in the PDD, MR and calculation spreadsheet.* | | No deviant parameter values have been used in the calculation sheet. | | |
| **E.3. Correctness of calculation** ***(VVS, §§ 244-245)*** *Check if the applied formulae and methods for calculating baseline emissions, project emissions and leakage are in accordance with the monitoring plan and / or the approved methodology.* *Assess whether the provided calculations are complete and reflect all requirements of the monitoring plan.* *Check especially that no standard or old values have been used for calculation where calculations based on up-to-date data is required.* | /XLS/ /MR/ /AM29/ /PDD/ | *Description:* According to AM0029 version 3, Emission Reduction $ER_y$, ($tCO_{2e}/y$) = $BE_y - PE_y - LE_y$ Where: $BE_y$ is the baseline emission during year y. $PE_y$ is the project emission during year y. $LE_y$ is the leakage of the project during year y. Baseline Emissions: $$BE_y = EG_{pj,y} \times EF_{BL,CO2,y}$$ Project Emissions: $$PE_y = FC_{NG,y} \times COEF_{NG,y}$$ $CO_2$ emission coefficient of natural gas per unit: $$COEF_{NG,y} = NCV_{NG,y} \times EF_{CO2,NG,y} \times OXID_{NG}$$ Leakage: $$LE_y = LE_{CH_4,y}$$ $$LE_{CH_4,y} = \left[FC_y \times NCV_{NG,y} \times EF_{NG,upstreamCH_4} - EG_{PJ,y} \times EF_{BL,upstreamCH_4}\right] \times GWP_{CH4}$$ | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| | | The emission reduction was calculated as net supplied electricity multiply emission factor deducted by project emission and leakage. The net supplied electricity was calculated through the data of Meter No.1 and Meter No.3 monthly readings. The emission factor is calculated ex post, which the latest DNA value has been adopted. The project emission and leakage calculations are in line with the methodology and MP.<br>*Verifier´s action:*<br>The calculation and MR were checked with the registered PDD, applied methodology. The net supplied electricity, the gas consumption and NCV value are cross checked through the monthly invoices and power balance sheets. The calculation sheet provided is free of mistakes.<br>*Conclusion:*<br>All calculations are complete and reflect all requirements of the monitoring plan. | | |
| **E.4. Emission reductions table**<br>***(EB 75, Annex 7, E.4)***<br>*Check if the MR includes a summary table of the emission reductions calculation specifiying separately*<br>- *Total baseline emissions*<br>- *Total project emissions:*<br>- *Total leakage*<br>- *Total emission reductions.* | /MR/ | ☒ The MR includes in section E.4 a summary table of the emission reductions calculation.<br>☒ The summary table specified the total baseline, project and leakage emissions as well as the total emission reductions separately.<br>☒ The values as specified in the ER summary table are correct; no issues have been identified during the verification which require changes in the ER calculation.<br>☐ During the verification issues with impact on the ER calculation have been identified. Thus subject to the | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *Assess whether the values are correct or need to be revised as a consequence of issues identified above.* | | closure of above listed findings the summary table in E.4 needs to be revised.<br>In this context the following additional findings have been identified:<br>N/A | | |
| **E.5. Comparison with ex-ante determined emission reductions**<br>***(EB 75, Annex 7, E.5; E.6)***<br>*Check if the MR includes a comparison of actual values of the monitoring period with the estimations in the registered PDD.*<br>*Check further whether in case of an increase an appropriate explanation is included in the MR.*<br>*Assess in case of a significant increase whether this is due to technical or organisational changes within or outside the control of the PP and – if this is case – whether the PRC have been considered appropriately.* | /XLS/ /MR/ /PDD/ | *Description:*<br>The actual emission reduction from 2011-04-01 to 2011-11-30 compared to the estimated ER in registered PDD (for 244 days) was higher.<br>*Verifier´s action:*<br>The relevant documents incl. electricity invoices, summary and daily meter reading records, MR, PDD etc. have been checked to be reliable. The ER comparison was reproduced by the verification team and assessed to be correct.<br>*Conclusion:*<br>The MR includes a comparison of the actual emission reductions of the monitoring period with the estimated ones in the registered PDD per monitoring period and per year. However, the CAR E1 was raised. | ~~CAR E1~~ | OK |
| **E.6. ER during the 1st commitment period and the period from 1 January 2013 onwards**<br>***(EB 75, Annex 7, E.7)***<br>*Check if the MR includes in chapter E.7 a breakdown* | /XLS/ /MR/ /PDD/ | ☒ The MR in section E.7 includes a summary table of the ER breakdown<br>*a) ER up to 2012-12-31 and*<br>*b) ER from 2013-01-01 onwards*<br>☒ The breakdown of the ERs during the first commitment | OK | OK |

| **Checklist Item**<br>(incl. guidance for the verification team) | **Refe-rence** | **Verification Team Comments**<br>(Means and results of assessment) | **Draft Concl.** | **Final Concl.** |
|---|---|---|---|---|
| *of the actual ER into*<br>*a) ER up to 2012-12-31 and*<br>*b) ER from 2013-01-01 onwards*<br>*The ERs for each period should be determined as per the actual generation. In cases where this is not possible or a cap has been applied a proportional (time related) approach should be chosen.* | | period and from 2013-01-01 onwards is as follows:<br>☒ The ER have completely been generated during the first commitment period<br>☐ The ERs have completely been generated from 2013-01-01 onwards,<br>☐ The ERs have partly been generated during the first commitment period and partly from 2013-01-01 onwards.<br>☒ The breakdown of the ERs is correct, considering the applicable guidance.<br>In this context the following additional findings have been identified:<br>N/A | | |

# ANNEX 2: STATEMENTS OF COMPETENCE OF INVOLVED PERSONNEL

TÜV NORD Certification

***Statement of Competence***

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

**Mr. Rainer Winter**

| SCHEME | STATUS | VALID UNTIL |
|---|---|---|
| CDM | Senior Assessor (Validation, Verification) Technical Reviewer | 2013-07-03 |
| JI | Senior Assessor Technical Reviewer | 2013-07-03 |
| VCS | Senior Assessor Technical Reviewer | 2013-07-03 |

Authorization status for technical areas within sectoral scopes:

| CODE | TECHNICAL AREA | TR SUBCATEGORIES |
|---|---|---|
| 1.1 | Thermal Energy Generation | |
| 1.2 | Renewable Energies | 1.2.1 Hydro<br>1.2.2 Wind<br>1.2.3 Geothermal<br>1.2.4 Solar<br>1.2.5 Tidal |
| 4.1 | Cement Sector | |
| 4.3 | Iron and Steel | |
| 4.5 | Waste Heat Recovery | |
| 5.1 | Chemical Process Industries | |
| 9.1 | Metal Production | |
| 11.1 | Chemical Process Industries | |
| 11.2 | GHG Capture and Destruction | |
| 12.1 | Chemical Process Industries | |
| 13.1 | Waste Handling and Disposal | 13.1.1 Waste Management |

003 – Rev. 5, Date: 2011-08-01

003_S01-F003_2011-08-01_rev5 S01-F003 rev0 / 2010-04-19

TÜV NORD Certification

***Statement of Competence***

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

**Mr. Yongjun Li**

| SCHEME | STATUS | VALID UNTIL |
|---|---|---|
| CDM Validation, Verification | Senior Assessor | 2013-06-26 |
| VCS | Senior Assessor | 2013-06-26 |

Authorization status for technical areas within sectoral scopes:

| CODE | TECHNICAL AREA |
|---|---|
| 1.2 | Renewable Energies |
| 13.1 | Waste Handling and Disposal |

039 – Rev. 0, Date: 2011-04-12

039_S01-F003_2011-04-12 S01-F003 rev0 / 2010-04-19

TÜV NORD Certification

***Statement of Competence***

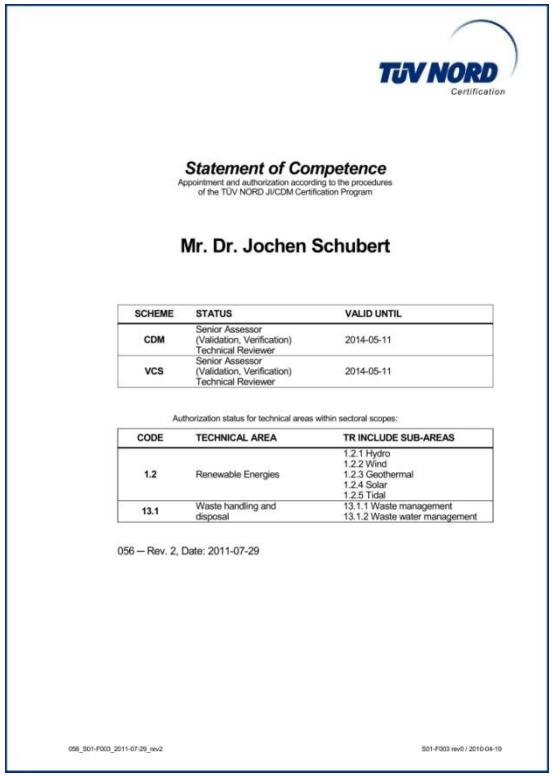
Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

**Mr. Jianmin Wu**

Authorization status for technical areas within sectoral scopes:

| CODE | TECHNICAL AREA |
|---|---|
| 1.1 | Thermal Energy Generation |
| 4.3 | Iron and Steel |
| 4.5 | Waste Heat Recovery |
| 5.1 | Chemical Process Industries |
| 11.1 | Chemical Process Industries |
| 12.1 | Chemical Process Industries - including verification - |

260 – Rev. 0, Date: 2011-04-18



TÜV NORD Certification

***Statement of Competence***

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

**Mr. Dr. Jochen Schubert**

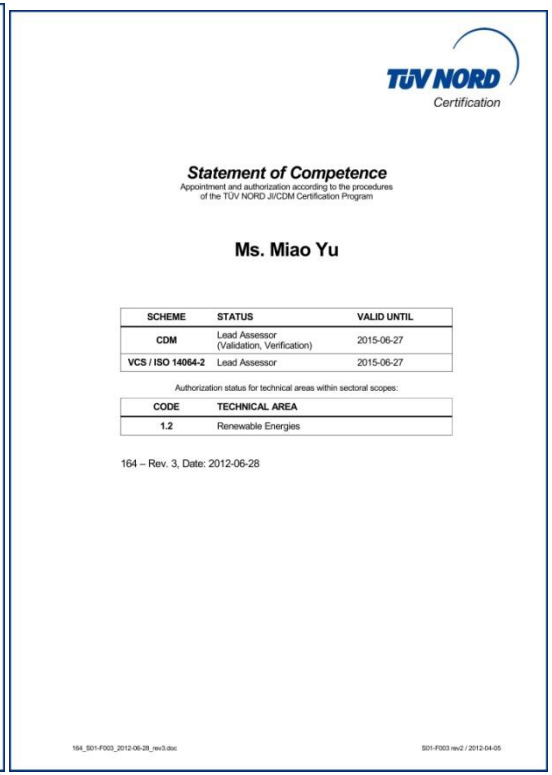
| SCHEME | STATUS | VALID UNTIL |
|---|---|---|
| CDM | Senior Assessor (Validation, Verification) Technical Reviewer | 2014-05-11 |
| VCS | Senior Assessor (Validation, Verification) Technical Reviewer | 2014-05-11 |

Authorization status for technical areas within sectoral scopes:

| CODE | TECHNICAL AREA | TR INCLUDE SUB-AREAS |
|---|---|---|
| 1.2 | Renewable Energies | 1.2.1 Hydro<br>1.2.2 Wind<br>1.2.3 Geothermal<br>1.2.4 Solar<br>1.2.5 Tidal |
| 13.1 | Waste handling and disposal | 13.1.1 Waste management<br>13.1.2 Waste water management |

056 – Rev. 2, Date: 2011-07-29

056_S01-F003_2011-07-29_rev2 S01-F003 rev5 / 2010-04-19



TÜV NORD Certification

***Statement of Competence***

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

**Ms. Miao Yu**

| SCHEME | STATUS | VALID UNTIL |
|---|---|---|
| CDM | Lead Assessor (Validation, Verification) | 2015-06-27 |
| VCS / ISO 14064-2 | Lead Assessor | 2015-06-27 |

Authorization status for technical areas within sectoral scopes:

| CODE | TECHNICAL AREA |
|---|---|
| 1.2 | Renewable Energies |

164 – Rev. 3, Date: 2012-06-28

164_S01-F003_2012-06-28_rev3.doc S01-F003 rev2 / 2012-04-05