VERIFICATION REPORT
-1ST PERIODIC-

HANDAN IRON & STEEL GROUP CO., LTD

Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd

Monitoring Period
2007-10-15 to 2008-02-29

Report No: QT-CDM25-07-08/123

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Date: 2008-08-27

Date of first issue: 2008-08-27	Project No.: QT-CDM25-07-08/123
Final approved by: Mr. Rainer Winter	Organisational unit: TÜV NORD JI/CDM Certification Program
Client: Carbon Asset Management Sweden AB	Client ref.: Mr. Marco Berggren

Summary:

Carbon Asset Management Sweden AB has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 1st periodic verification of the project: *"**Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd**"*, with regard to the relevant requirements for CDM project activities. The project activity generates electricity by using of waste excess gas (BFG and COG) produced in steel plant to meet the captive electricity demand. This verification covers the period from 2007-10-15 to 2008-02-29.

This verification is carried out as first periodic verification. A risk based approach has been followed to perform this verification. In the course of the verification 3 Corrective Action Requests (CAR) were raised.

The verification is based on the monitoring reports (dated: 10th March 2008 (published) and latest version dated 20th August. 2008), the monitoring plan as set out in the validated PDD, the validation report and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

The final monitoring report (dated 20th August 2008) is in compliance with applied monitoring methodology and validated monitoring plan.

As the result of the 1st periodic verification, 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:

Baseline emissions:	**172,530**	t CO_{2eq}
Project emissions:	**-**	t CO_{2eq}
Leakage	**-**	t CO_{2eq}
Emission reductions:	**172,530**	**t CO_{2eq}**

Report No.: QT-CDM25-07-08/123	Subject Group: Environment	
Report title: *Verification Report –Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd*		
Work carried out by: Mr. LI Yong Jun Ms. Yan Wei Chen Mr. Martin Saalmann		
Technical Reviewer: Eric Krupp		
Date of this revision: 2008-08-27	Rev. No.: 0	Number of pages: 41

Indexing terms

Climate Change, CDM, Verification, Kyoto Protocol

Abbreviations

BFG	**Blast Furnace Gas**
CA	**Corrective Action / Clarification Action**
CAR	**Corrective Action Request**
CCPP	**Combined Cycle Power Plant**
CDM	**Clean Development Mechanism**
CER	**Certified Emission Reduction**
CO_2	**Carbon dioxide**
CO_2eq	**Carbon dioxide equivalent**
COG	**Coke Oven Gas**
CR	**Clarification Request**
ER	**Emission Reduction**
FAR	**Forward Action Request**
GHG	**Greenhouse gas(es)**
LOG	**Electronic data storage**
MM	**Monitoring Manual**
MR	**Monitoring Report**
MR	**Monitoring Plan**
PDD	**Project Design Document**
PP	**Project Participant**
QA/QC	**Quality Assurance / Quality Control**
UNFCCC	**United Nations Framework Convention on Climate Change**
VAL	**Validation report**
VVM	**Validation and Verification Manual**

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1. INTRODUCTION

Carbon Asset Management Sweden AB has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 1st periodic verification of the project: *"Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd"*, with regard to the relevant requirements for CDM project activities. The verifiers have reviewed the GHG data collected for the first monitoring period covering the period 2007-10-15 to 2008-02-29.

1.1. Objective

The objective of the 1st periodic verification is the review and ex post determination by an independent entity of the GHG emission reductions. It includes the verification of the data given in the monitoring report by checking the monitoring records and the emissions reduction calculation.

1.2. Scope

The verification of this registered project is based on the validated project design document /PDD/, the monitoring report /MR-2/, 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 documents and information are reviewed against the requirements and criteria mentioned below. The TÜV NORD JI/CDM CP has, based on the recommendations in the Validation and Verification Manual /VVM/, employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

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

- 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 17/CP.7 /MA/, and subsequent decisions made by the Executive Board and COP/MOP,
- Other relevant rules, including the host country legislation,
- Monitoring plan as given in the registered PDD /PDD/.
- Approved CDM Methodology ACM0004 (Version 2, March 2006).

1.3. GHG Project Description

1.3.1. Project Characteristics

Essential data of the project is presented in the following Table 1-1

Table 1-1: Project Characteristics

Item	Data
Project title	Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd
CDM registration No.	1262
Date of registration	15th October 2007
Project Scope	1 – Energy Industries (renewable - / non-renewable sources)
Applied Methodology (Registered)	ACM0004/ Version 02 ACM0002/ Version 6
Crediting period	10 yr
Start of crediting period	15th October 2007
Host country	China

1.3.2. Project Parties

People's Republic of China (host country)

Sweden & Netherlands (Annex 1 countries)

1.3.3. Project Participants

The following project participants are involved in the project activity as per Modalities of Communication:

Table 1-2: Project participants

Project Participant 1:	Handan Iron & Steel Group Co., Ltd No. 232, Fuxing Road Handan City Hebei Province P. R. China 056015
Contact person:	Mrs. Zhang Rui Tel: 86-310-6072098 Mob: Email: zhangrui@mail.hgjt.cn
Project Participant 2:	Carbon Asset Management Sweden AB

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Sweden
111 36
Contact Person: Mr. Niels von Zweigbergk
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Mob: +46 708 59 35 00
Email: co2@tricorona.se

1.3.4. Project Location

The project is located in the Handan Iron & Steel Group Co., Ltd. The site is at distance of 2 km northwest of Handan City, Hebei Province, People's Republic of China. The project's geographical co-ordinates are east longitude 114°26'34''and northern latitude 36°36'28''.

1.3.5. Technical Project Description

The project uses CCPP (Combined Cycle Power Plant) technology. The main fuel used is BFG. Auxiliary Fuel used is COG.

In the first cycle, BFG is burned and the resulting combustion gases drive the gas turbines (2×28.5 MW) and finally the electricity generators are driven to produce electricity. Then, the hot exhaust gas is lead to heat-recovery steam generator (boiler), where the heat in hot exhaust gas is utilized to boil water and create steam. The steam then spins additional steam turbine-generators (2×20.5 MW) and produces more electricity.

The operational life time of the project is 20 years at least.

The key parameters for the project are given in table 1-3:

Table 1-3: Key parameters of the project

Gas Turbines	
Type:	M251S
Manufacturer:	Mitsubishi Corporation
Quantity:	2
Rated speed	5015 rpm
Rated Power:	28.5 MW
Gas Turbine Generators	
Type:	05GZ910/AA010/

Manufacturer:	Mitsubishi Corporation
Quantity:	2
Rated Capacity:	33530 kVA
Rated voltage:	10500 V
Inlet Air Temperature:	42 °C
Cooling Water Temperature:	34 °C
Boilers	
Type:	Q386/568-77.3(9.9(-6.08(0/3)/483(190)
Manufacturer:	Hangzhou Air Blower Company LTD
Quantity:	2
Rated Steam volume	77.3 (9.9) t/h
Rated Steam temperature	483 (190) °C
Steam Turbines	
Type:	NK50/71/0
Manufacturer:	Hangzhou Turbine Machines Factory
Quantity:	2
Rated speed	5513 rpm
Rated Power	20.5 MW
Steam Turbine Generators	
Type:	QFU-22-2
Manufacturer:	Shandong Jinan electricity-generating device plant
Quantity:	2
Rated Voltage:	10.5 kV
Rated Power	22 MW

The electricity generated by the project is transmitted through the 110 kV transformers to the internal electricity system of Handan Iron & Steel Group Co., Ltd. for internal use so as to displace the electricity that would have been imported from the North China Power Grid.

The project commenced electricity production on 25th December 2006. The unit 1 (gas turbines and generators) was connected to the internal electricity system on 25th December 2006 and unit 2 (steam turbines and generators) was connected to the internal electricity system on 24th May 2007.

The crediting period (10 years) has started on October 15th 2007 (registration date).

During the first periodic verification, covering the period 2007/10/15 to 2008/02/29, it was found that the technology and the capacity of the turbines and generators used under the project activity were installed as described in the PDD. Also the project complies with all relevant statutory requirements.

2. VERIFICATION TEAM

The Verification Team was led by

- **Mr. Yong Jun LI**, TUV NORD China, Shanghai. Mr. Li, Dipl. in Environment Technology, is a TÜV-CERT Lead auditor for ISO 9001/14001 and OHSAS 18001. Currently he is In-charge-CDM Manager for TÜV NORD China operation. He is an appointed assessor for JI/CDM certification program of TÜV NORD.

For this verification he is assisted by

- **Ms. Yanwei Chen**, TUV NORD – Shanghai, China. Ms. Chen, BEng. in Environment Engineering and MSc. in Air Pollution Management & Control, is an appointed Expert for JI/CDM certification program of TÜV NORD.
- **Mr. Martin Saalmann**, TÜV NORD CERT GmbH, is an appointed JI/CDM Expert in the JI/CDM Certification Program of TÜV NORD.

The technical review is done by

- **Mr. Eric Krupp**. He is an expert in the field of environmental approval procedures as well as national and international Emission Trading. He worked in different projects in the framework of the German allocation procedure and the verification of the annual CO_2 emission reports. Mr. Krupp is an appointed JI/CDM assessor and the deputy of TÜV NORD JI/CDM certification program.

The final verification report is approved by

- **Mr. Rainer Winter**. Mr. Winter works at TÜV NORD as ISO 9001/ 14001 Auditor and environmental verifier for EMAS. He is also an approved emission verifier within the European Emission Trading Scheme. Mr. Winter is an authorized JI/CDM assessor and is in charge of the JI/CDM Certification Program of TÜV NORD CERT GmbH.

3. METHODOLOGY

The verification of the project was carried out from March 2008 to August 2008.

Preparations: *From 2008-03-10 to 2008-03-13*

On-site verification: *2008-03-19*

Reporting*:* *2008-05-06 to 2008-08-27*

The verification consisted of the following steps:

- A desk review of the Monitoring Report /MR1//MR2/ and additional supporting documents which were submitted by the client. A customised verification protocol /CPM/ according to the Validation and Verification Manual /VVM/ was used,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer,
- Verification reporting.

3.1. Verification Protocol

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

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

The applied verification protocol consists of:

- Table 1 (Data Management System/Controls)
- Table 2 (GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing) as described in figure 3-1.

The completed verification protocol is enclosed in the annex to this report.

Periodic Verification Checklist ***Table 1: Data Management Systems/Controls***			
Expectations for GHG data management system/controls	***Comments***	***Draft Conclusion***	***Final Conclusion***
The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table.	*Description of circumstances and further commendation to the conclusion.*	*This is either acceptable based on review of MR and supporting Documents (**OK**), or a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Draft Verification report. The Initial Verification has additional **Forward Action Requests (FAR)**. FAR indicates essential risks for further periodic verifications*	*CARs and CRs raised in the Draft Conclusion have to be closed or resolved. The final conclusion determines the final statement. FARs could remain in this section as they are subject in the next consecutive verification.*

Periodic Verification Checklist

Table 2: 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.* *The following measures were taken in order to minimize the corresponding risks.* *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:* - *Sample cross checking of manual transfers of data* - *Recalculation* - *Spreadsheet 'walk throughs' to check links and equations* - *Inspection of calibration and maintenance records for key equipment* - *Check sampling analysis results* *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.*

Figure 3-1 : Verification protocol tables

3.2. Review of Documentation

The following documents were reviewed:

- the validated version of the PDD including the monitoring plan /PDD/,
- the draft version of the monitoring report, including the claimed emission reductions for the project /MR1/,
- the revised monitoring report /MR2/
- the validated version emission reduction calculation spreadsheet /XLS/
- the validation report /VAL/

Other supporting documents, such as training records/TPR/, daily meter reading records /DMR/, monthly meter reading records /MMR/, and meter calibration certificates /MC/ were also reviewed.

3.3. On-site assessment

The assessment performed during the verification enabled the verifier to arrive at a conclusion regarding the readiness of the project to generate high quality emission reductions. As such, it was 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 on-site assessment included an investigation of whether all relevant equipments are installed and work as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- Metering equipment was checked and positions of counters were recorded in order to prepare for the next periodic verification.
- The project operator has provided evidence that all metering equipment was duly calibrated.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data itself was checked on the basis of business data and meter reading records.

Especially during the on-site visit on 2008-03-19 the verification team of TÜV NORD JI/CDM CP performed interviews with the project participant /IM01/ and project consultant) /IM02/ to confirm selected information and to resolve issues identified in the document review. Representatives of the project participant, the consultant and the operational staff of the plant were interviewed. The main topics of the interviews are summarised in Table 3-1.

Table 3-1 Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1. Projects & Operations Personnel /IM01/ 2. Consultant /IM02/	- Desk review findings - General aspects of the project - Project design, Commissioning and implementation - Technical equipment and operation of the project - Performance of the project - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring and measurement equipment - QA/QC Testing and calibration procedures - Monitored data management - Data quality, archiving and reporting procedures - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification

3.4. Resolution of Forward and Corrective Action Requests

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:

- there is a clear deviation concerning to the above mentioned applicable criteria (esp. the monitoring plan).
- requirements set by the monitoring plan or qualifications in the validation opinion have not been met; or
- there is a risk that the project would not be able to deliver emission reductions.

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

- the actual status requires a special focus on this item for the next consecutive verification, or
- an adjustment of the monitoring plan is recommended.

The verification team may also use the term Clarification Request (CR), which would be issued if:

- additional information is needed to fully clarify an issue.

4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report /MR1/, and revised monitoring report /MR2/, the PDD /PDD/ and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

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

Table 4-1: Summary of CAR, FAR and CR

Verification topic	No. of CAR	No. of FAR	No. of CR
Project Implementation	1	0	0
Completeness of Monitoring	0	0	0
Accuracy of emission reduction calculations	2	0	0
Quality of Evidence to Determine Emission Reductions	0	0	0
Management system and quality assurance	0	0	0
SUM	**3**	**0**	**0**

For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

4.1. Remaining issues, CARs and CRs from previous validation

All raised CARs and CRs were successfully closed during the validation of the project design. There are no remaining issues. The verification has been carried out based on the final registered PDD and CDM-UNFCCC Project registration sheet.

4.2. Project Implementation

The project has been implemented as described in the PDD /PDD/. There are no major changes in the key equipment since the validation of the project.

The project consists of 2 electricity generation units, each unit having 2 generators. Power generated from the gas turbines and generators 1# & 2# is fed to 110 kV main lead 1# while power generated from the steam turbines and generators 3# & 4# is fed to 110 KV main lead 2#, through 110 kV transformers.
The unit 1 (gas turbines and generators) was connected to the grid on 25th December 2006 while unit 2 (steam turbines and generators) was connected to the grid on 24th May 2007.

All required equipments and procedures are available and implemented in an appropriate manner.

The Power Metering system of the project is as in the Attachment 1.

There are 26 meters installed in total.

M1, M2, M3 and M4 are installed besides each generator. They are for monitoring the generated electricity from the 4 generators respectively. They were installed in October 2006.

M5 and M6 are installed on 110 kV main lead # 1 and 110 kV main lead # 2 respectively, which are the connection points of the project activity and the internal electricity system of Handan Iron & Steel Group Co., Ltd. They are installed as back-up system for the net electricity supply if the main meters fail. They were installed in November 2006. During the course of the first periodic verification the main meters operated without failures, thus M5 and M6 were not used to derive emission reductions.

M7 - M26 are installed besides each of the electricity-using equipments (e.g. pump, ventilation, water cooling system, etc.). They are for monitoring internal electricity use, among which, M7-M16 were installed on September 29th 2007 while M17-M26 were installed on October 8th 2007.

All the meters are of the same type. The technical information of meters is as below:

Table 4-2: Technical information of meters

Type:	SL761A071
Supplier	Beijing Yupont Electric Power Technology Co., Ltd.
Accuracy:	0.2S
Voltage	3*100V
Current	5(10)A
Frequency	50Hz

For meter serial number and factor, please refer to Attachment 2.

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.

The submitted monitoring report which forms the basis of the verification was prepared by summarizing consolidated monthly data over the whole monitoring period in accordance with the monitoring plan of the PDD.

During the monitoring period covering 2007/10/15 to 2008/02/29 the project exported 175,603.53 MWh of net electricity to internal electricity system of Handan Iron & Steel Group Co., Ltd. This part of electricity would otherwise be supplied by the grid. This was verified by the verification team during the on site visit by checking the monthly meter reading records/MMR/, daily meter reading records/DMR/ and monitoring report.

Regarding regular licenses and permissions the license of project environmental commence permission should be submitted (refer to CAR 3).

4.3. Completeness of Monitoring

The monitoring report provides procedures as well as a list of all parameters that need to be monitored which is in line with the monitoring manual submitted to the verifier and monitoring plan provided in the CDM PDD of the project.

Readings of all the 26 meters are automatically recorded:

On-line monitoring system retrieves data from the meters to the data assembly point every 5 minutes; control center updates electronic records according to data assembly point every 1 hour.

Staff manually records meter readings every 1 day.

Daily and monthly electricity summary for any of the 26 meters can be automatically generated in the monitoring system, which forms the basis for monitoring report and emission reduction calculation.

4.4. Accuracy of Emission Reduction Calculations

For the calculation of baseline emissions the ex-ante and validated value of baseline parameters, i.e., NCPG Emission Factor is taken into account which is a validated and registered value.

Baseline Emissions:

The formula used for the determination of baseline emissions is consistent with the PDD:

Baseline Emissions (tCO_2/yr) = Grid Emission Factor (EFy) X Net Export to internal grid

(0.9825 tCO_2/MWh) (175603.53 MWh/yr)

The baseline emissions (BE) during the monitoring period are 172,530 tCO_2.

Project Emission & Leakage:

In accordance with ACM0004 ver.2, the project emissions and leakage were ignored.

Emission Reduction:

Summary of Emission Reductions using above formula during the monitoring period:

Parameters	Baseline Emissions			Emission Reductions
	Net Export displaced of NCPG	Grid Emission Factor of NCPG	Baseline Emissions	
Year	(MWh)	(tCO_2/MWh)	(tCO_2)	(tCO_2)
15/10/2007-31/10/2007	27988.996	0.9825	27499.1886	27499.1886
01/11/2007-30/11/2007	38707.91	0.9825	38030.52	38030.52
01/12/2007-31/12/2007	44160.124	0.9825	43387.32	43387.32
01/01/2008-31/01/2008	38018.76	0.9825	37353.43	37353.43
01/02/2008-29/02/2008	26727.742	0.9825	26260.01	26260.01
Total	**175603.53**		**172530.47**	**172530.47**

Verification team verified following parameters:

- Daily meter recording sheets
- Monthly meter recording sheets

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

Nevertheless some inconsistency was found in the reported data source and section D of monitoring report. CAR 1 is raised.

According to registered PDD, the meters shall be calibrated by qualified third party at least once per year. However, meter calibration certificates are pending. CAR 2 is raised.

CAR 1 and CAR 2 were closed. CAR 1 was closed by re-calculation so that the data is consistent. Appropriate measures were implemented by the project operator. The manual calculations will be conduct by at least two monitoring staff in future verifications.

Calibration certificates for each meter were provided by the project operator clearly indicating that the third party *Hebei Electric Power Research Institute* was responsible for calibration during the monitoring period. Thus CAR 2 is closed.

4.5. Quality of Evidence to Determine Emission Reductions

The only key monitoring parameter with influence on the calculation of the emission reductions is the net power displaced from the NCPG. The power is measured with high accuracy and duly calibrated class 0.2S power meters.

Net power displaced from NCPG is calculated as below:

EG_{GEN} = M1 + M2 + M3 + M4.

EG_{AUX} = M7 + M8 + M9 + … + M26

$EG_y = EG_{GEN} - EG_{AUX}$

In the event that any of the meters above operated outside its error limit, then the data from M5 and M6 shall be used to monitor the Net Electricity supplied to the grid:

EG_y = M5 + M6

However during the first periodic verification period the calculation method $EG_y = EG_{GEN} - EG_{AUX}$ was not used as all main meters operated well.

Readings of all the 26 meters are automatically recorded:

On-line monitoring system retrieves data from the meters to the data assembly point every 5 minutes; control center updates electronic records according to data assembly point every 1 hour.

Staff manually records meter readings every 1 day. All records needed for monitoring are archived in line with the requirements of the monitoring manual /MM/ and registered monitoring plan /PDD/. No significant, lack of evidence and missing data were detected during on-site verification.

It could be evidenced that the monitoring system ensures continuous operation.

4.6. Management System and Quality Assurance

The allocation of responsibilities is documented in a written form. Routines for the archiving of data are defined and documented. Calculations will be laid down in the monitoring report in line with PDD.

The Energy Power Plant Division is responsible for record keeping relating to on site data collection and on site meter calibrations and checks.

Mr. Ma Yongqiang is responsible for collection of data related to power generation and communication on meter calibrations with Power Supply Bureau of Handan City.

Every month, net electricity supplied to internal grid will be reported to CDM responsible person by the Energy Power Plant Division.

The monitoring personnel are trained and follow reproducible routines. They have the necessary competence to carry out the relevant tasks with sufficient accuracy. All necessary monitored and measured raw data were checked during on-site verification.

The key parameter, i.e. net electricity displaced from the grid is measured by main meters and check meters, as indicated in Section 4.5. In case of breakdown of main meters, the check meters are used for recording of electricity. The immediate change

of these meters in the case of breakdown is regulated as part of operational & maintenance procedure.

All monitored data are archived both in physical (daily data) and partly in electronic (hourly, daily and monthly data) form. The data will be kept for the whole crediting period and additional 2 years as given in the PDD.

The details have been addressed in the previous chapter 4.5.

Summary of Findings and Conclusions

The findings of the first periodic verification process are summarized in the table 4-3 below.

Table 4-3: Periodic Verification Findings

Topic	#		
Accuracy of emission reduction calculations	**CAR 1**	Classification	☒ CAR ☐ FAR ☐ CR ☐ None
		Findings	Some inconsistency was found in the reported data source and Section D of monitoring report.
		Corrective Action	The inconsistency was meter reading for M1 during October 15th to 31st, 2007. It has been recalculated and checked from the DCS system that this data is correct in the monitoring report. Calculation method and explanation has been provided.
		Additional comment	Submitted calculation method and explanation are checked OK. Data in monitoring report is accepted.
		Conclusion	☐ To be checked during next periodic verification ☒ Appropriate action was taken ☒ MR was corrected correspondingly ☐ Appropriate action was not taken ☐ The project complies with the requirements

Topic	#		
Accuracy of emission reduction calculations	**CAR 2**	Classification	☒ CAR ☐ FAR ☐ CR ☐ None
		Findings	Meter calibration certificates are pending.
		Corrective Action	The meter calibration records for M1~M26 have been provided to DOE.
		Additional comment	The meter calibration records for M1 - M26 are checked OK.
		Conclusion	☐ To be checked during next periodic verification ☒ Appropriate action was taken ☐ MR was corrected correspondingly ☐ Appropriate action was not taken ☐ The project complies with the requirements

Topic	#					
Project Implementation	**CAR 3**	Classification	☐ CAR	☒ FAR	☐ CR	☐ None
		Findings	The license of project environmental commence permission should be submitted.			
		Corrective Action	The environmental commence permission has been available and provided to the DOE.			
		Additional comment	The submitted environmental commence permission is checked OK.			
		Conclusion	☐ To be checked during next periodic verification ☒ Appropriate action was taken ☐ MR was corrected correspondingly ☐ Appropriate action was not taken ☐ The project complies with the requirements			

5. PROJECT SCORECARD

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Calculated Emission Reductions	
Completeness	• Source coverage/ boundary definition	✓	✓	✓	The relevant sources are covered by the monitoring plan. The project boundaries are defined correctly and transparently.
Accuracy	• Physical Measurement and Analysis	CAR 1 CAR 2	✓	CAR 1 CAR 2	The key parameters were measured by duly calibrated measurement equipment with a high accuracy. Nevertheless, some mistakes were detected.
	• Data calculations	✓	✓	✓	The emission reductions are calculated correctly.
	• Data management & reporting	✓	✓	✓	The monitoring and data management system is in place and functional.
Consistency	• Changes in the project	✓	✓	CAR 3	The project has been implemented as described in the PDD. However inconsistencies were found.

6. VERIFICATION STATEMENT

Carbon Asset Management Sweden AB has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 1st periodic verification of the project: *"**Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd**"*, with regard to the relevant requirements for CDM project activities. The project activity generates electricity by using of waste excess gas (BFG and COG) produced in steel plant to meet the captive electricity demand. This verification covers the period from 2007-10-15 to 2008-02-29.

This verification is carried out as first periodic verification. A risk based approach has been followed to perform this verification. In the course of the verification 3 Corrective Action Requests (CAR) were raised.

The verification is based on the monitoring reports (dated: 10th March 2008 (published) and latest version dated 20th August. 2008), the monitoring plan as set out in the validated PDD, the validation report and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

The final monitoring report (dated 20th August 2008) is in compliance with applied monitoring methodology and validated monitoring plan.

As the result of the 1st periodic verification, 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:

Baseline emissions:	172,530	t CO_{2eq}
Project emissions:	-	t CO_{2eq}
Leakage	-	t CO_{2eq}
Emission reductions:	**172,530**	**t CO_{2eq}**

Shanghai, 2008-08-27

LI Yong Jun
TÜV NORD JI/CDM Certification Program
Verification Team Leader

Essen, 2008-08-27

Rainer Winter
TÜV NORD JI/CDM Certification Program
Senior Assessor

7. REFERENCES

Table 7-1: Documents provided by the project proponent

Reference	Document
/CCE/	"Check and accept" report from Environmental Protection Bureau, [2008]77, 5th June 2008 ~~***(pending)***~~
/CIM/	Corresponding information of meters and devices
/CM/	Calculation method of the line loss
/DMR/	Daily Meter reading records of 15/10/2007, 31/10/2007 and 29/02/2008
/MC/	Meter calibration certificate ~~***(pending)***~~
/MM/	Monitoring Manual
/MR1/	Published Monitoring Report titled "Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd" dated 10th March 2008
/MR2/	Final Monitoring Report titled "Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd" dated 20th August 2008
/MMR/	1. Monthly Meter reading records from November 2007 to February 2008 2. Meter reading records on 15th Octber 2007 and 31st October 2007
/MTI/	Technical information of meters
/PCD/	Power Connection Diagram
/QCC/	Qualification Certificate of the calibration entity
/TPR/	Staff training plan & record (related to CDM, device operating, monitoring and QA)

Table 7-2: Background investigation and assessment documents

Reference	Document
/ACM/	Approved CDM Methodology ACM0004 (Version 2) and ACM0002 (Version 6)

Reference	Document
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/IPPC-RM/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/KP/	Kyoto Protocol (1997)
/MA/	Decision 17/CP. 7 (Marrakesh – Accords & Annex to decision 17/CP.7)
/PDD/	Final Project Design Document for CDM project: *'Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd'*
/VAL/	Validation Report for CDM project *'Waste gases utilisation for Combined Cycle Power Plant in Handan Iron & Steel Group Co., Ltd'*
/VVM/	IETA, PCF Validation and Verification Manual

Table 7-3: Websites used

Reference	Link	Organisation
/unfccc/	http://cdm.unfccc.int	UNFCCC
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications

Table 7-4: Interviewed Persons

Reference		Name	Organisation / Function
/IM01/	☒ Mr. ☐ Ms.	Li Wei	Device and Technique Office, Handan Iron & Steel Group Co., Ltd / Technician
/IM01/	☒ Mr. ☐ Ms.	Ma Yongqiang	Technical Center of Handan Iron & Steel Group Co., Ltd / CDM contactor
/IM02/	☒ Mr. ☐ Ms.	Yang Weihua	Hebei CDM Project Office / CDM developer

ANNEX

Verification Protocol

Periodic Verification Checklist

Table 1: Data Management System/Controls

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
1. Defined organisational structure, responsibilities and competencies			
1.1. Position and roles *Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.*	The overall authority of the project site belongs to Handan Iron & Steel Group Co., Ltd. Mr. Liu Rujin, the Chairman, takes overall responsibility of the company. Mrs. Zhang Rui and Mr. Jia Quanru act on behalf of the Chairman. Mr. Ma Yongqiang is responsible for collection of data related to monitoring and communication on meter calibrations with Power Supply Bureau of Handan City. The personal responsible for the project management including monitoring are academically qualified and have adequate knowledge of these procedures. The competency of personnel performing work is enhanced by appropriate training.	OK	
1.2. Responsibilities *Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.*	Mr. Ma Yongqiang is appointed as CDM person in charge and is responsible for the collection of the monthly electricity summary, establishing of monthly electricity balance calculation, meters calibration and calculation of emission reductions.	OK	

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
1.3. *Competencies needed* *Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required.*	Staff competence on the GHG reduction management was assessed during the on-site interviews. The training of monitoring measurement was performed before the project operation.	OK	
2. Conformance with monitoring plan			
2.1. Reporting procedures *Reporting procedures should reflect the monitoring plan content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified.*	The reporting is in line with the requirements of the validated monitoring plan as well as with the applied methodology ACM0004. Nevertheless some inconsistency was found in the reported data source and Section D of monitoring report.	~~CAR 1~~	OK
2.2. Necessary Changes *Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.*	No changes to the monitoring plan identified.	OK	
3. Application of GHG determination methods			
3.1. Methods used *There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.*	The reporting procedures reflect the monitoring plan and the emission reductions are calculated as per the methods described in the validated PDD of the registered project. According to the methodology, the emission reduction		

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
	factor was determined ex-ante as combined margin (CM). The calculations of the baseline emissions / emission reductions were checked by the verification team. Please refer to CAR 1.	~~CAR 1~~	OK
3.2. Information/process flow *An information/process flow diagram, describing the entire process from raw data to reported totals is developed.*	Key data (net electricity displaced) is taken from main meter and backup meter reading records. This data is the basis for the calculation of emission reductions as given in the calculation spreadsheets.	OK	
3.3. Data transfer *Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.*	The method of data transfer was verified on-site and they are in compliance with the procedures defined	OK	
3.4. Data trails *Requirements for documented data trails are defined and implemented and all documentation are physically available.*	The monitoring related records and documents were archived in forms of hardcopy and softcopy and managed by the monitoring officer. The license of project environmental commence permission should be submitted.	~~CAR 3~~	OK
4. Identification and maintenance of key process parameters			

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
4.1. Identification of key parameters *The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.*	The critical parameters for the determination of GHG emissions are the produced amount of net electricity, which is measured by main meter. A backup meter system is in place in the event that the main meters fail.	OK	
4.2. Calibration/maintenance *Appropriate calibration/maintenance requirements are determined.*	According to registered PDD, monitoring manual and monitoring report, the meters should be calibrated at least once per year. However, meter calibration certificates are pending.	~~CAR 2~~	OK
5. GHG Calculations			
5.1. Use of estimates and default data *Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.*	The carbon emission factor is used as combined margin (CM), which consisting of the combination of operating margin (OM) and build margin (BM) and determined ex-ante in the validated PDD. The IPCC values of emission factor, NCV, oxidation factor are used as a predetermined default value which has been defined in the PDD and confirmed during verification of the project.	OK	
5.2. Guidance on checks and reviews *Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.*	The emission reduction was calculated as net supplied electricity multiplied with the emission factor. The net supplied electricity was calculated through the data of hourly, daily and monthly meter reading records. The emission factor is fixed for the whole crediting period. Calculation approach of the line loss in case of main meter failure is defined by the project proponent.	OK	

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
5.3. Internal validation and verification *Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.* *Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.*	The relevant data is taken from main meter readings. Internal audits are periodically carried out on monitoring and measurement. Nevertheless some inconsistency was found in the reported data source and Section D of monitoring report.	~~CAR 1~~	OK
5.4. Data protection measures *Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).*	All data stored at the plant are archived in forms of hardcopy and softcopy. The monitoring office is responsible for records control.	OK	
5.5. IT systems *IT systems used for GHG monitoring and reporting should be tested and documented.*	GHG monitoring is done through on-line monitoring system and is cross-check by manual meter recording. All calculations necessary for purpose of emissions reduction monitoring can be done on the basis of Ms-Excel. The basis for the verification of the emission reductions are the value of electricity exported and imported to/from grid as well as the value indicated in the electricity monthly invoices.	OK	

Periodic Verification Checklist Table 2: 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*)
Raw data generation				
• Installation of measuring equipment • Dysfunction of installed equipment • Mal operation by operational personnel • Downtimes of equipment • Exchange of equipment • Capacity additions • Change of technology	• Installation of modern and state of the art equipment • On line meter readings / independent counter-checks • Regular visual inspect-ions of installed equip-ment • Only skilled and trained personnel operate the relevant equipment • Immediate exchange of dysfunctional equipment • Stand-by duty is organized • Training • Internal counterchecks	• Capacity additions • Inadequate installation / operation of the monitoring equipment. • Inadequate exchange of equipment. • Change of personnel • Undetected measurement errors • In case meters have been changed or replaced or modified, if it has occurred	• Check of equipment • Check of technical data sheets • Site – visit • Counter-check of meter readings and commercial data	**OK**

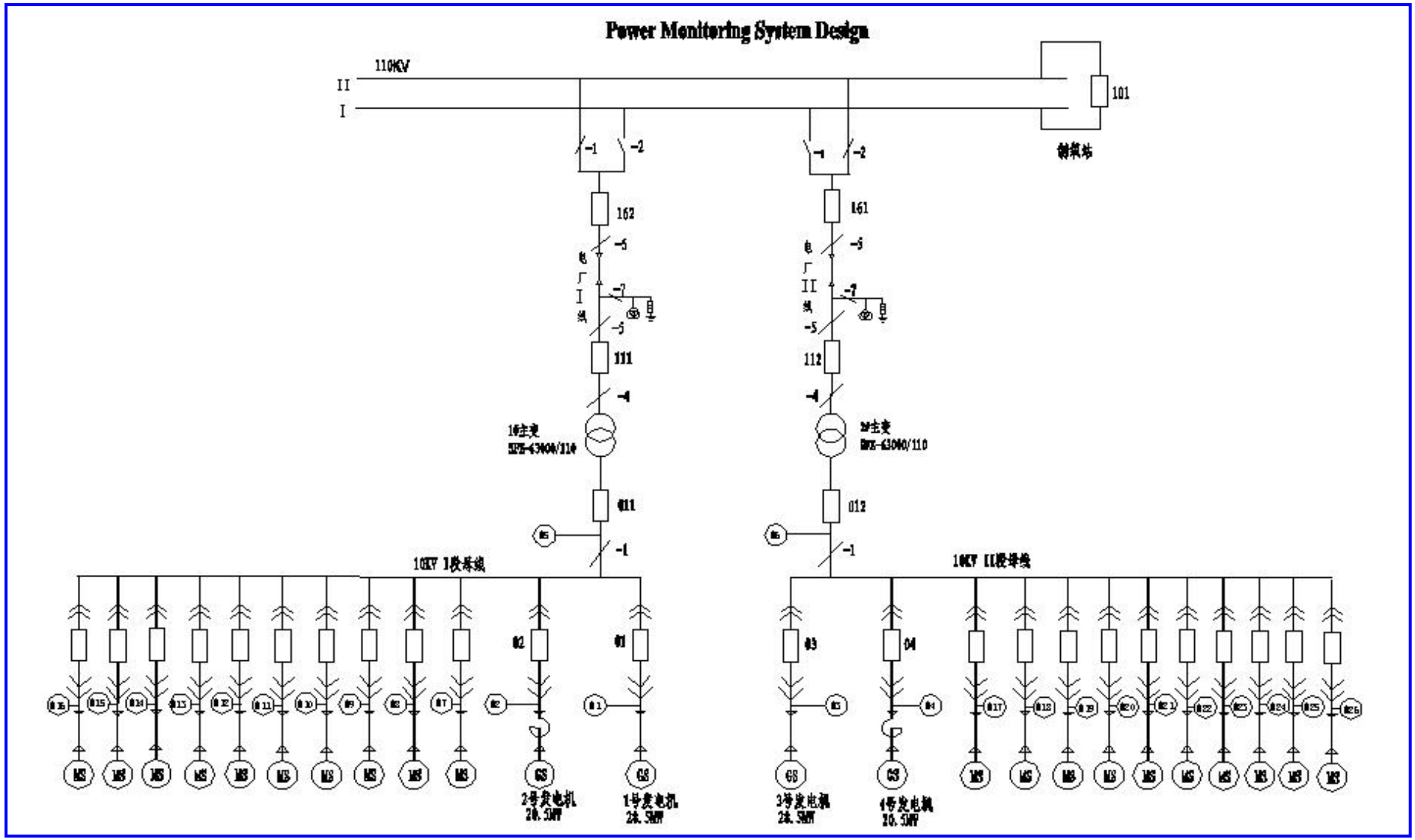
Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Raw data collection				
• Metering records • Operational log sheets • Calibration and maintenance data • Accuracies • Manuals and other manufacturer data • Accounting records	• Exclusive installation and operation of duly calibrated equipment • Cross-check of data • Redundant manual meter readings • Appropriate archiving system • Appointment of competent external measurement institutes for calibration holding the corresponding accreditations • International as well as national calibration standards • Clear allocation of responsibilities	• Unintended usage of old data that has been revised • Incomplete documentation • Ex-post corrections of accounting records • Ambiguous sources of information	• Check of calibration records • Check of individual (raw data) figures	**OK**

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*)
Data aggregation				
• IT Systems • Spread sheet programming • Manual data transmission • Data protection • Responsibilities	• Clear allocation of responsibilities • Usage of standard software solutions (Spreadsheets) • Limited access to IT systems • Data protection procedures	• Manual data transfer mistakes • Unintended change of spread sheet programming or data base entries • Problems caused by updating/upgrading or change of applied software	• Check of data aggregation • Counter-calculation	**OK**
Other calculation parameters				
• Data sources • Emission factors • Accuracies	• Ex ante calculation of baseline • All used values and data sources applied are defined in the monitoring plan.	• No residual risk	None	**OK**
Calculation Methods				
• Calculation approach • Applied formulae	• Appropriate IT and archiving system	• The danger of miscalculation can only be	Countercheck on the basis of own calculation.	**OK**

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*)
• Lack of clarity in the monitoring plan	• Usage tested Excel spreadsheets	minimized.		
Monitoring reporting				
• Data transfer to the author of the monitoring report • Issuance of the monitoring report	• An experienced consultant is responsible for monitoring reporting	• The danger of data transfer mistakes can only be minimized	• Counter check with evidence provided.	**OK**

Attachment 1

Power Connection Diagram


Power Monitoring System Design
110KV
II
I
101
162
161
111
112
011
012
10KV I段母线
10KV II段母线
02
01
03
04
2号发电机
1号发电机
3号发电机
4号发电机

Attachment 2

Meter Serial Number and Factor

Meter	Serial Number	Factor
M1	36013919	50000
M2	36014076	40000
M3	36013923	50000
M4	36014009	40000
M5	36014036	80000
M6	36013975	80000
M7	36018962	4000
M8	36013946	4000
M9	36014022	4000
M10	36013914	4000
M11	36013994	4000
M12	36014154	4000
M13	36013966	4000
M14	36014025	4000
M15	36014021	4000
M16	36014062	4000
M17	36013997	4000
M18	36014150	4000

Meter	Serial Number	Factor
M19	36014037	4000
M20	36013996	4000
M21	36013918	4000
M22	36013924	4000
M23	36014016	4000
M24	36013972	4000
M25	36014040	4000
M26	36014013	4000