VERIFICATION REPORT

- INITIAL AND 1ST PERIODIC –

MINEGAS GMBH

UTILIZATION OF COAL-MINE-METHANE "EWALD 1/2/7"

MONITORING PERIOD 12/2003 – 07/2006

Report No: 8000333846-06/30-V01

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Approved by: W. Wielpütz	Organisational unit: TÜV NORD JI/CDM Certification Program
Client: Minegas GmbH	Client ref.: Mr. Michael Kaminski

Summary:

Minegas GmbH has commissioned the TÜV NORD JI/CDM Certification Program to carry out the initial and 1st periodic verification of the project: "Utilization of Coal Mine-Methane Ewald 1/2/7", with regard to the relevant requirements for JI project activities. The project reduces GHG emissions by combustion of Coal Mine Methane and thereby converting it into CO_2 with less GWP. This verification covers the period from 2003-12-01 to 2006-07-31.

This verification is carried out as a combined initial and first periodic verification. A risk based approach has been followed to perform this verification. In the course of the verification no Corrective Action Requests (CARs) or CRs were raised. Only 3 Forward Action Requests (FARs) were raised.

The project is currently in the host government approval procedure. Thus no LoA has been obtained yet. The verification is based on the monitoring report (August 2006), 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 participants. Additional to the provisions of the monitoring plan, due to contractual stipulations, the Simplified Small Scale Methodology AMS III.D. was considered and applied. As a result of the initial verification, the verifier confirms that:

- the project is implemented and installed as planned and described in the validated project design document, except the deviations displayed in the Monitoring Report in Chapter 6. Since the start of operation three additional CHP units were installed.
- the installed equipment essential for generating emission reductions runs reliable and is calibrated appropriately.
- the monitoring system is in place and functional. The project is ready to generate GHG emission reductions. A comprehensive monitoring procedure should be implemented.

As the result of the 1st 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:

Baseline emissions:	378,127	t CO_{2eq}
Project emissions:	49,517	t CO_{2eq}
Emission reductions:	**328,610**	**t CO_{2eq}**

Report No.: 8000333846-06/30-V01	Subject Group: Environment
Report title: *Verification Report – Utilization of Coal Mine-Methane Ewald 1/2/7*	
Work carried out by: Rainer Winter, Dr. Detlef Nehm, Eric Krupp	
Work verified by: Wolfgang Wielpütz	

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Indexing terms

Climate Change, JI
Joint Implementation, CMM
Verification, Kyoto Protocol

Abbreviations

CAR	**Corrective Action Request**
CDM	**Clean Development Mechanism**
CH_4	**Methane**
CHP	**Combined Heat Power**
CMM	**Coal Mine Methane**
CO_2	**Carbon dioxide**
CO_{2eq}	**Carbon dioxide equivalent**
CP	**Certification Program**
CR	**Clarification Request**
DEHSt	**German Emissions Trading Authority**
EMAS	**Environmental Management and Audit Scheme**
ER	**Emission Reduction**
ERU	**Emission Reduction Unit**
EU-ETS	**EU Emissions Trading Scheme**
FAR	**Forward Action Request**
GHG	**Greenhouse gas(es)**
GWP	**Global Warming Potential**
JI	**Joint Implementation**
kW	**Kilowatt**
LoA	**Letter of Approval**
MW	**Megawatt**
PDD	**Project Design Document**
UNFCCC	**United Nations Framework Convention on Climate Change**

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1. INTRODUCTION

The Minegas GmbH has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the initial and 1st periodic verification of the project: "Utilization of Coal Mine-Methane Ewald 1/2/7", with regard to the relevant requirements for JI project activities. The verifiers have reviewed the GHG data collected for the period between 2003-12-01 and 2006-07-31.

1.1. Objective

The purpose of this verification is a combined initial and 1st periodic verification.

The objective of the initial verification, which is not a mandatory JI requirement, is to verify that the project is implemented as planned and described in the project design document /PDD/ and to confirm that the monitoring system is implemented and fully functional to generate emission reductions.

The objective of the 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 is based on the validated project design document /PDD/, the monitoring report /MR/, supporting documents handed over to the verifier and information got by 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 6 of the Kyoto Protocol /KP/,
- guidelines for the implementation of Article 6 of the Kyoto Protocol as presented in the Marrakech Accords under decision 16/CP.7 /MA/, and the annex to the decision (JI-Rules),
- other relevant rules, including the host country legislation,
- monitoring plan as given in the PDD /PDD/.
- Simplified CDM Small Scale Methodology AMS III.D /III.D/
- Contractual stipulations applicable for this (early) verification.

For the purpose of this early verification - as JI is only applicable from 2008 on - in addition to the approved monitoring plan the CDM-Methodology AMS III.D/III.D/ for small scale project activities was considered and followed.

1.3. GHG Project Description

1.3.1. Project Scopes

The GHG project can be classified in the sector given in Table 1-1 (according to UNFCCC sectoral scope numbers for CDM).

Table 1-1: Project Scopes

No.	Project Scope
10	Fugitive emissions from fuels (solid, oil and gas)

*) as per applied meth AMS III.D /III.D/

1.3.2. Project Parties

Germany and The Netherlands.

The project is presently in the host government approval procedure. Thus no LoAs have been obtained so far. As both LoAs are required for generation of ERUs a corresponding FAR[1] was raised.

[1] For definition of FAR see chapter 3.4

1.3.3. Project Participants

The following project participants are involved in the project activity:

Participant 1:
Minegas GmbH
Rüttenscheider Str. 1-3
D-45128 Essen
Germany

Participant 2:
Carbon-TF B.V.
Hertog Eduartstraat 4
5913 EX Venlo
The Netherlands

1.3.4. Project Location

The project is located at:

Postal Address
Ewaldstraße
45699 Herten

Land registry entry
Gemarkung: Herten
Flur 82
Flurstück: 39, 58

1.3.5. Technical Project Description

The project involves 6 co-generation gas-engines for recovery and combustion of coal mine methane (CMM) from a closed coal mine gallery. The technology used in the project is of combined heat & power (CHP) type. The key data submitted within the Monitoring Report are given in the table 1-2 mentioned below.

Table 1-2: Technical and operational data

CHP gas engines	
Manufacturer	Deutz 16K620
Number / formation of cylinders	16 / V
Cylinder capacity	70.8 dm^3
Rotational frequency	1,500 1/min
No. of units	6 (three of these units were installed after start of operation)
Capacity (electrical power)	6 x 1.358 MW_{el} total 8.148 MW_{el}

The emission reductions are a result of the recovery of CMM out of the coal mine which otherwise would be emitted diffusely to the atmosphere.

2. VERIFICATION TEAM

- The Verification Team was led by Mr. Rainer Winter. Mr. Winter works at TÜV NORD CERT GmbH as ISO 9001 and ISO 14001 Auditor, as an environmental verifier for EMAS, and as a DEHSt-appointed emission verifier in the framework of the EU-ETS. Mr. Winter has been appointed as JI/CDM assessor and is in charge of the TÜV NORD JI/CDM CP. For this verification he was assisted by:
- Dr Detlef Nehm. He works at TÜV NORD CERT GmbH as ISO 9001/ISO 14001 Auditor and environmental verifier for EMAS. He is also an approved emission verifier within the European Emission Trading Scheme. Dr. Nehm is an authorized JI/CDM assessor.
- 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, the verification of the annual CO_2 emission reports and the validation/verification of several JI and CDM projects as an assistant of the validation/verification teams of TÜV NORD CERT GmbH respectively TÜV NORD JI/CDM CP. Mr. Krupp is an appointed JI/CDM Expert.

The final verification report is verified by

- Mr. Wolfgang Wielpütz. He is ISO 9001 and 14001 Auditor, environmental verifier for EMAS and DEHSt-appointed emission verifier in the framework of EU-ETS. He is appointed JI/CDM assessor. Mr. Wielpütz is the head of the department: "Integrated management systems, environmental and occupational safety" and deputy chief of TÜV NORD CERT GmbH.

3. METHODOLOGY

The verification of the project was carried out from June to September 2006:

Preparations: *From 2006-06-02 to 2006-06-11*

On-site verification: *2006-06-12 and 2006-07-17*

Reporting*:* *From 2006-07-18 to 2006-09-07*

The verification consisted of the following steps:

- A desk review of the Monitoring Report /MR/ submitted by the client and additional supporting documents with the use of the a customised verification protocol /CPM/ according to the Validation and Verification Manual /VVM/,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- 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 organises, details and clarifies the requirements a JI project is expected to meet;
- It ensures a transparent verification process where the independent entity will document how a particular requirement has been proved and the result of the verification.

The applied verification protocol consists of:

- The Initial Verification Checklist and
- three Periodic Verification Checklists: Table 1 (Data Management System/Controls); Table 2 (GHG calculation procedures and management control testing) and Table 3 (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.

Initial Verification Checklist			
Objective	***Reference***	***Comments***	***Conclusion (incl. FARs/CARs)***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*Description of circumstances and further commendation to the conclusion.*	*This is either acceptable based on evidence provided (**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 Verification report.* *The Initial Verification has additional **Forward Action Requests (FAR)**. FAR indicates essential risks for further periodic verifications*

Periodic Verification Checklist ***Table 1: Data Management Systems/Controls***		
Expectations for GHG data management system/controls	***Score***	***Verifiers Comments (including Forward Action Requests)***
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.	*A score is assigned as follows:* ***Full** - all best-practice expectations are implemented.* ***Partial** - a proportion of the best practice expectations is implemented* ***Limited** - this should be given if little or none of the system component is in place.*	*This is either acceptable based on evidence provided (**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 Verification report.* *The Initial Verification has additional **Forward Action Requests (FAR)**. FAR indicates essential risks for further periodic verifications*

Periodic Verification Checklist ***Table 2: GHG calculation procedures and management control testing***		
Identification of potential reporting risk	***Identification, assessment and testing of management controls***	***Areas of residual risks***
Identify and list potential reporting risks based on an assessment of the emission estimation procedures. *Identification of key source data.* *Focus on those risks that impact the accuracy, completeness and consistency of the reported data.*	*Identification of the key controls for each area with potential reporting risks. Assessment of the adequacy of the key controls and eventually test that the key controls are actually in operation.* *Internal controls include:* - *Understanding of responsibilities and roles,* - *Reporting, reviewing and formal management approval of data;* - *Procedures for ensuring data completeness, conformance with reporting guidelines, maintenance of data trails etc.*	*Identification of areas of residual risks, i.e. areas of potential reporting risks where there are no adequate management controls to mitigate potential reporting risks.* *Areas where data accuracy, completeness and consistency could be improved are highlighted.*

Periodic Verification Checklist ***Table 3: Detailed audit testing of residual risk areas and random testing***		
Areas of residual risks	***Additional verification testing performed***	***Conclusions and Areas Requiring Improvement (including Forward Action Requests)***
List of the residual areas of risks (Periodic Verification Checklist Table 2 where detailed audit testing is necessary.) *In addition, other material areas may be selected for detailed audit testing.*	*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 last revision of the PDD including the monitoring plan,
- the last revision of the monitoring report, including the claimed emission reductions for the project,
- the last revision of the validation report.

Other supporting documents, such as technical drawings, manuals of equipment suppliers, performance records, meter readings, installation and calibration documents and business data 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 equipment is installed and works 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 were checked via spot sample on the level of the meter recordings.

In the period of 2006-06-02 to 2006-06-12, the verification team of TÜV NORD JI/CDM CP performed interviews with project participants to confirm selected information and to resolve issues identified in the document review. Representatives of Minegas GmbH, Steag AG, Carbon TF, G.A.S. Energietechnologie GmbH and Lambda Gesellschaft für Gastechnik mbH including 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
Mr. Beßelmann *Minegas GmbH* Mr. Kummer *Steag AG, Energie Center* Mr. van Egeren Mr. Engels Mr. Dietrich *G.A.S. Energietechnik GmbH* Mr. Beek *Lambda GmbH* Mr. Rzadki *Steag AG* Dr. Meyer, Mr. Hadulla, Ms. Pohlig *Carbon TF*	- General aspects of the project - Technical equipment and operation - Monitoring and measurement equipment - Project design and implementation - Involved personnel and responsibilities - Monitoring data - Data uncertainty and residual risks - GHG calculation - Training and practice of the operational personnel - Editorial aspects of the monitoring report

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 were a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, where:

- 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 a 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) indicates essential risks for further periodic verifications. Forward Action Requests are issued, where:

- 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 where:

- 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, the 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
Remaining issues	0	1	0
Project implementation	0	1	0
Internal and external data	0	0	0
Environmental and social indicators	0	0	0
Management and operational system	0	1	0
Completeness of Monitoring	0	0	0
Accuracy of emission reduction calculations	0	0	0
Quality of evidence to determine emission reductions	0	0	0
Management system and quality assurance	0	0	0
SUM	**0**	**3**	**0**

Initial Verification Topics

Periodic Verification Topics

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

4.1. Initial Verification Findings

4.1.1. Remaining issues, CARs and CRs from previous validation

All raised CARs and CRs were successfully closed during the validation of the project design.

Nevertheless, as the validation of the project is a prerequisite for granting of the LoA in Germany, the host and sponsor party approval was not addressed during the validation.

The project is presently in the host government approval procedure. Thus no LoAs have been obtained so far. As both approvals are required for generation of ERUs a corresponding FAR was raised.

The PDD including the monitoring plan was validated against the JI requirements applicable for this kind of projects. The validation has resulted in a positive opinion. Due to contractual stipulations additional to the validated monitoring plan the simplified CDM small scale methodology AMS III.D. was considered in this verification where it provides additional requirements for monitoring.

In the PDD/PDD/ esp. in the monitoring plan two different approaches (input and output) for the monitoring were described.

Based on first experiences regarding the completeness and the accuracy of the monitored data, the approach to determine the GHG emissions via the power output was chosen in the monitoring report. The input approach was only taken for plausibility check.

AMS III.D. requires the measurement of the CMM volume flow rate and the CH_4 – concentration. Both measurements were implemented and maintained properly. Nevertheless the accuracy of the input volume flow rate could only be estimated.

Therefore the verification team has arrived at the conclusion that the output approach is appropriate for the monitoring of the project and the baseline emissions and can be assessed as more reliable and more conservative (i.e. the ER of the input approach where calculated to be higher than those of the output approach).

Thus the output approach is assessed to be the eligible method to calculate the emission reductions for the given monitoring period.

4.1.2. Project Implementation

The project has basically been implemented as described in the PDD /PDD/. Some deviations to the PDD are addressed in the Monitoring Report /MR/ (chapter 6). These deviations have only minor influence on the monitoring of the baseline and project emissions and thus to the calculation of emission reductions.

During the validation the emission reduction calculation was carried out with 3 units. In the meantime three additional units have been installed. All 6 units that were operated within the monitoring period are considered within this project activity.

Two different measurements of the volume flow rate were installed and operated by Lambda GmbH within the project activity.

a) Thermoelectric measurement of Binder GmbH

b) Rotational frequency measurement of the compressor units.

The preferred measurement is the rotational frequency measurement using the characteristic line of the compressor units. During the verification it could not be assessed if this measurement meets the necessary accuracy requirements.

In order to ensure sufficient data quality in subsequent verifications a corresponding FAR was raised.

4.1.3. Internal and external data

All relevant data are collected continuously and stored during the whole monitoring period. The instruments are well known and state of the art. The employees responsible for the monitoring were trained in an appropriate manner. The monitoring equipment is well known by the personnel of Minegas GmbH and their contractors G.A.S. and Lambda. The personnel are working with comparable devices in their daily routine.

For the calculation of the project emissions as well as for baseline emissions the electrical efficiency of the CHP-plant is necessary. According to the monitoring plan the invariant efficiency of 37 % was taken for calculation of ER. A corresponding efficiency analysis of TÜV Nord Systems GmbH /TÜV1/ has ensured the conservativeness of this value.

Additional parameters for the calculation of emission reductions, such as densities, calorific values, stoichiometric values, carbon emission factors were taken from publicly available sources. All applied values could be confirmed by the verification team.

4.1.4. Management and Operational System

The procedures for the monitoring of the plant performance are well implemented. All interfaces between the involved companies are clearly defined as part of the contractual stipulations. Furthermore the data computation is mostly determined by the software used by the involved entities.

The personnel responsible for the monitoring are well trained and follow reproducible routines. The operational procedures are assessed as adequate to carry out the monitoring tasks with sufficient accuracy.

Nevertheless a comprehensive monitoring procedure including all interfaces and responsibilities is still pending. A corresponding FAR was raised.

4.1.5. Summary of Findings and Conclusions

Topic	#					
Remaining issues, CARs and CRs from previous validation	**FAR 1**	Classification	☐ CAR	☒ FAR	☐ CR	☐ None
		Findings	The host and sponsor party approvals are pending.			
		Corrective Action	-			
		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			
Project implementation	**FAR 2**	Classification	☐ CAR	☒ FAR	☐ CR	☐ None
		Findings	Evidence is required that the volume flow rate measurement meets the necessary accuracy requirements. If this evidence cannot be provided, an additional measurement has to be implemented.			
		Corrective Action	-			
		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			
Internal and External Data	**-**	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings	-			
		Corrective Action	-			
		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			
Management and operational system	**FAR 3**	Classification	☐ CAR	☒ FAR	☐ CR	☐ None
		Findings	A comprehensive procedure for the monitoring process including tasks and responsibilities is missing.			
		Corrective Action	-			
		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			

4.2. Periodic Verification Findings

4.2.1. Completeness of Monitoring

The reporting procedures reflect the requirements of the monitoring plan. All relevant data is collected continuously and stored during the whole monitoring period.

During the verification process no significant lacks of evidence were detected.

4.2.2. Accuracy of Emission Reduction Calculations

The key parameter power output was measured by a calibrated meter meeting the requirements of the German Weights and Measures Act.

The quality of the installed direct CMM volume flow rate measurement was discussed in chapter 4.1.2. To ensure the conservativeness the obtained values were only considered for plausibility check.

The calculations of the emission reductions are basically simple. The used parameters, such as density or calorific value of the methane are literature values. The estimation of the electrical efficiency of the CHP plant is conservative regarding the danger of over-estimation of emission reductions.

The most important monitoring data (i.e. power output) is transmitted by a remote data transmission system. The meter readings were checked for plausibility by the responsible personnel of Minegas GmbH and STEAG AG.

The aggregated data were checked by the verification team by spot samples on the level of the 15 min values and the records of the meter readings from the operational journal.

The calculations of the baseline and project emissions as well as the emission reductions were checked by the verification team using own spread sheets. These calculations have shown the same results as given in the monitoring report /MR/.

4.2.3. Quality of Evidence to Determine Emission Reductions

The key parameter power output was measured by a calibrated meter. Hertener Stadtwerke GmbH provided the power meter and is responsible for the calibration. The calibration of these devices follows the German Weights and Measures Act and will be renewed periodically in intervals given by legislation.

The gas analyser of the methane concentration and the volume flow rate measurement devices were calibrated periodically by Lambda GmbH.

The net-efficiency of the gas-engines has been analysed by TÜV NORD Systems GmbH in September 2006 /TÜV1/. The analysis determined an electrical efficiency of

significantly less than 37 % for all installed engines. However, for the calculation of the project emissions the electrical efficiency was estimated, in a conservative manner, as 37 %. The external efficiency analysis/TÜV1/ confirms the conservativeness of this estimation.

Additional parameters for the calculation of emission reductions, such as densities, calorific values, stoichiometric values and carbon emission factors were taken from publicly available sources. All applied values could be confirmed by the verification team.

To summarise all used parameters are of sufficient and appropriate quality to assure an accurate monitoring.

4.2.4. Management System and Quality Assurance

The management system related issues were discussed as part of the initial verification in chapter 4.1.4.

The quality assurance of the project activity is assessed to be very advanced as at least 3 companies are involved in similar tasks. This leads to several counterchecks of all data related to the monitoring.

Nevertheless a comprehensive procedure for all functions and responsibilities is still pending (see FAR 3).

4.2.5. Summary of Findings and Conclusions

Topic	#					
Completeness of monitoring	,	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings	-			
		Corrective Action	-			
		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			
Accuracy of emission reduction calculations	,	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings	-			
		Corrective Action	-			
		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			
Quality of evidence to determine emission reductions	,	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings	-			
		Corrective Action	-			
		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			
Management system and quality assurance	,	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings	-			
		Corrective Action	-			
		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	ü	ü	ü	All relevant sources are covered by the monitoring plan. The project boundaries are defined correctly and transparently.
Accuracy	• Physical Measurement and Analysis	FAR 2	FAR 2	FAR 2	Evidence is required that the volume flow rate measurement meets the necessary accuracy requirements. If this evidence cannot be provided, an additional measurement has to be implemented.
	• Data calculations	ü	ü	ü	The emissions and emission reductions are calculated correctly.
	• Data manage-ment & reporting	FAR 3	FAR 3	FAR 3	A comprehensive procedure for the monitoring process including tasks and responsibilities is missing
Consistency	• Changes in the project	-	-	-	The project has basically been implemented as described in the PDD. Some deviations to the PDD are addressed in the Monitoring Report (chapter 6). Three additional units were installed after start of operation. These deviations have only minor influence on the monitoring of the baseline and project emissions and thus to the calculation of emission reductions.

6. VERIFICATION STATEMENT

Minegas GmbH has commissioned the TÜV NORD JI/CDM Certification Program to carry out the initial and 1st periodic verification of the project: *"Utilization of Coal Mine-Methane Ewald 1/2/7"*, with regard to the relevant requirements for JI project activities. The project reduces GHG emissions by combustion of Coal Mine Methane and thereby converting it into CO_2 with less GWP. This verification covers the period from 2003-12-01 to 2006-07-31.

This verification is carried out as a combined initial and first periodic verification. A risk based approach has been followed to perform this verification. In the course of the verification no Corrective Action Requests (CARs) or CRs were raised. Only 3 Forward Action Requests (FARs) were raised.

The project is currently in the host government approval procedure. Thus no LoA has been obtained yet. The verification is based on the monitoring report (August 2006), 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 participants. Additional to the provisions of the monitoring plan, due to contractual stipulations, the Simplified Small Scale Methodology AMS III.D. was considered and applied. As a result of the initial verification, the verifier confirms that:

- the project is implemented and installed as planned and described in the validated project design document, except the deviations displayed in the Monitoring Report in Chapter 6. Since the start of operation three additional CHP units were installed.
- the installed equipment essential for generating emission reductions runs reliable and is calibrated appropriately.
- the monitoring system is in place and functional. The project is ready to generate GHG emission reductions. A comprehensive monitoring procedure should be implemented.

As the result of the 1st 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:

Baseline emissions:	378,127	t CO_{2eq}
Project emissions:	49,517	t CO_{2eq}
Emission reductions:	**328,610**	**t CO_{2eq}**

In the following table the annual allocation of the emission reduction is presented:

Year	2002	2003	2004	2005	2006	Sum
Emission Reductions in $tCO_{2eq.}$	**-**	**27**	**96,617**	**159,602**	**72,364**	**328,610**

Essen, 2006-09-07

Rainer Winter
TÜV NORD JI/CDM Certification Program
Verification Team Leader

7. REFERENCES

Table 7-1: Documents provided by the project proponent

Reference	Document
/PDD/	Final Project Design Document for JI project 'Utilization of Coal Mine-Methane Ewald 1/2/7', submitted December 2005
/MR/	Monitoring Report 'Utilization of Coal Mine-Methane Ewald 1/2/7' for the period 2003 December 01 to 2006 July 31, submitted August 2006
/TÜV1/	Analysis of net efficiency: Bericht über die Wirkungsgradbestimmung an Grubengas BHKW-Modulen der Minegas GmbH; 2006-09-06
/VAL/	Validation Report issued by RWTÜV / TÜV NORD JI/CDM CP, dated 2005-12-30

Table 7-2: Background investigation and assessment documents

Reference	Document
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/KP/	Kyoto Protocol (1997)
/MA/	Decision 16/CP.7 (Marrakech Accords): Guidelines for the implementation of Article 6 of the Kyoto Protocol
/III.D/	Indicative simplified baseline and monitoring methodologies for the small-scale CDM project activity category III.D. Methane Recovery (AMS III.D.) version 8 (March 3rd 2006)
/VVM/	IETA, PCF Validation and Verification Manual (V. 4)

Table 7-3: List of interviewed persons

Reference	MoI[1]		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	Kummer	Steag Energy Center
/IM02/	V	☒ Mr. ☐ Ms.	van Egeren	G.A.S. Energietechnologie GmbH Operation Engineer
/IM02/	V	☒ Mr. ☐ Ms.	Engels	G.A.S. Energietechnologie GmbH Operating Surveillance
/IM03/	T	☒ Mr. ☐ Ms.	Dr. Meyer	Carbon TF Project Consultant
/IM03/	T	☒ Mr. ☐ Ms.	Mr. Hadulla	Carbon TF Project Consultant
/IM03/	T	☐ Mr. ☒ Ms.	Pohlig	Carbon TF Project Consultant
/IM04/	V	☒ Mr. ☐ Ms.	Beßelmann	Steag AG CMM deposit management
/IM04/	V	☒ Mr. ☐ Ms.	Dietrich	G.A.S. Energietechnologie GmbH Operation Engineer
/IM04/	V	☒ Mr. ☐ Ms.	Beek	Lambda Operation Engineer
/IM04/	V	☒ Mr. ☐ Ms.	Rzadki	Steag AG Technician measurement devices

ANNEX

ANNEX: VERIFICATION PROTOCOL

Initial Verification Checklist

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
A. Opening Session			
A.1. Introduction to audits	/IM01/ /IM02/ /IM04/	Audit participants were the following persons: Interviewed persons: Mr. Beßelmann Mr. van Egeren Mr. Engels Mr. Dietrich Mr. Beek Mr. Kummer Mr. Rzadki TÜV NORD JI/CDM CP Verification Team: Mr. Rainer Winter, Mr. Eric Krupp	OK
A.2. Clarification of access to data archives, records, plans, drawings etc.	/IM04/	All required data, records and plans were provided to the verification team. Access to all relevant facilities was granted	OK
A.3. Contractors for equipment and installation works	/PDD/ /VAL/	The 6 gas engines and the other technical equipment are supplied by G.A.S Energietech-	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
	/IM01/ /IM04/ /MR/	nologie GmbH. The electricity meters have been provided by Hertener Stadtwerke GmbH. Furthermore Minegas GmbH concluded contracts regarding operation surveillance with Lambda GmbH as well as with the supplier of the CHP plant G.A.S for maintenance needs.	
A.4. Actual status of installation works	/PDD/ /MR/ /IM04/	The project has been fully implemented and has started electricity production in December 2003	OK
B. Open issues indicated in validation report *Especially in projects which are not yet registered at CDM-EB or JI-SB, there might be some outstanding issues which should have been indicated by the validation report.*			
B.1. Missing steps to final approval	/VAL/	The project has not yet been approved by both parties (Germany and The Netherlands). The LoA from the German Government was applied for. The approval from the parties involved is a prerequisite for generating ERUs	FAR 1

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
C. Implementation of the project *This part is covering the essential checks during the on-site inspection at the project's site, which is indispensably for an initial verification*			
C.1. Physical components *Check the installation of all required facilities and equipment as described by the PDD.*	/PDD/ /VAL/ /MR/ /TÜV1/ /IM04/	The project has basically been implemented as described in the PDD. Some deviations to the PDD are addressed in the Monitoring Report (chapter 6). These deviations have only minor influence on the monitoring of the baseline and project emissions and thus to the calculation of emission reductions. During the validation the emission reduction calculation was carried out with 3 units. In the meantime three additional units have been installed. All 6 units that were operated within the monitoring period are considered within this project activity. Two different measurements of the volume flow rate were installed and operated by Lambda GmbH within the project activity. a) Thermoelectric measurement of Binder GmbH b) Rotational frequency measurement of the compressor units. The preferred measurement is the rotational frequency measurement using the characteristic line of the compressor units. During the	FAR 2

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
		verification it could not be assessed if this measurement meets the necessary accuracy requirements. Nevertheless the results of the installed direct volume flow rate measurement were considered for purpose of plausibility check.	
C.2. Project boundaries *Check whether the project boundaries are still in compliance with the ones indicated by the PDD.*	/PDD/	The project boundary is the physical geographical site of the methane recovery facility.	OK
C.3. Monitoring and metering systems *Check whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.*	/PDD/ /VAL/ /MR/ /IM01/ /IM02/ /IM04/ /TÜV1/	The necessary monitoring instruments for the measurement of the power output are installed. These measuring devices are well known and state of the art. The following measurements are performed continuously and are registered at least every 15 minutes: - Power output by an ISKRA electricity meter - CMM amount: volume flow rate measurement - CH_4-Concentration: infrared-measurement The necessary action to ensure the data quality of the volume flow rate measurement is given in FAR 2 The net-efficiency check was performed by an external entity.	FAR 2

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
		The business data (sold electricity) were determined monthly.	
C.4. Data uncertainty *How will data uncertainty be determined for later calculations of emission reductions? Is this in compliance with monitoring and metering equipment?*	/PDD/ /VAL/ /MR/ /IM04/ /TÜV1/	For the calculation of the project emissions as well as for baseline emissions the electrical efficiency of the CHP-plant is necessary. According to the MP the invariant efficiency of 37 % was taken for calculation of ER. A corresponding efficiency analysis of TÜV Nord Systems GmbH has ensured the conservativeness of this value. Additional parameters for the calculation of emission reductions, such as densities, calorific values, stoichiometric values and carbon emission factors were taken from publicly available sources. All applied values could be confirmed by the verification team.	OK
C.5. Calibration and quality assurance *Check how monitoring and metering systems are subject to calibration and quality assurance routines* *a) with installation* *b) during future operation*	/MR/ /IM01/ /IM04/ /TÜV1/	Hertener Stadtwerke GmbH provided the power meter and is responsible for the calibration. The calibration of this equipment follows the German Weights and Measures Act and will be renewed periodically in intervals given by legislation. The gas analyser for the measurement of the methane concentration is checked and	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
		calibrated periodically by Lambda. The net-efficiency of the gas-engines has been analysed by TÜV NORD Systems GmbH in September 2006.	
C.6. Data acquisition and data processing systems *Check the eligibility of used systems.*	/IM01/ /IM02/ /IM04/	The monitored data regarding the produced electricity is recorded automatically via remote data transmission by the Energy Centre of Steag AG. This data was transferred to a SQL based server solution, which sends the data to an extranet interface, where all responsible personnel can check the data at any time from every computer with internet access. All the other data were recorded in the operational journal and can be checked via remote data transmission from the engine management system software. This data were checked and recorded by Lambda as well as G.A.S.	OK
C.7. Reporting procedures *Check how reports with relevance for the later determination of emission reductions will be generated*	/IM01/ /IM02/ /IM04/	Recorded data, operational journal and annual reports are stored by Steag AG Energy Centre, Lambda and G.A.S. electronically in adequate IT Systems for the whole crediting period and additional two years.	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
C.8. Documented instructions *Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions have access and knowledge of documented instructions, forming a part of the project's management system.*	/IM01/ /IM02/ /IM04/	The procedures for the monitoring of the plant performance are well implemented. All interfaces between the involved companies are clearly defined as part of the contractual stipulations. Furthermore the data computation is mostly determined by the software used by the involved entities. The personnel responsible for the monitoring are well trained and follow reproducible routines. The operational procedures are assessed as adequate to carry out the monitoring tasks with sufficient accuracy. Nevertheless a comprehensive monitoring procedure including all interfaces and responsibilities is still pending.	FAR 3
C.9. Qualification and training *Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions has the appropriate competences, capabilities and qualifications to ensure the required data quality.*	/IM01/ /IM02/ /IM04/	The employees responsible for the monitoring were appropriately trained. The monitoring equipment is well known by the personnel of Steag AG, Lambda and G.A.S as energy production, energy distribution, production and operation of CHP units and measurement of gaseous fuels are the core businesses of these companies. The personnel are working on comparable facilities in their daily routine.	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
C.10. Responsibilities *Check whether all tasks required to gather data and prepare a monitoring report with the necessary quality have been allocated to responsible employees.*	/MR/ /IM01/ /IM02/ /IM04/	Minegas GmbH is the operator of the coal-mine-methane gas engines, so the company is responsible for - Operating - Management - Data recording - Emission reductions monitoring - Calculation of the emission reductions - Verification of the emission reductions by an independent entity. Minegas GmbH has concluded an operation and maintenance contract with the supplier of the engines G.A.S. Within the contractual agreements, G.A.S is responsible for the maintenance of the co-generation plants. Furthermore Minegas GmbH has concluded an operation and maintenance contract with Lambda, which is responsible for the operation of the compressor units and the measurement of volume flow rate, temperature, pressure and methane concentration. Carbon-TF B.V. supports Minegas GmbH in the monitoring, calculation and verification process.	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
C.11. Troubleshooting procedures *Check whether there are possibilities of redundant data monitoring in case of having problems with the used monitoring equipment. Such procedures may reduce risks for the buyers of emission reductions (e.g. the Client)*	/IM01/ /IM02/ /IM04/	The monitoring equipment is checked regularly by the operational staff of Lambda and Steag AG. In case of malfunction the metering devices will send a notice of malfunction to the headquarter of Steag AG Energy Centre as well as to the technician who is in charge via short message on his mobile phone. In case of breakdown of measuring devices, the unit will be substituted immediately. Responsible of the substitution of the power meter is the provider of the meter Herner Stadtwerke GmbH. Responsible for the substitution of the volume flow rate and the CH_4 concentration measurement devices is Lambda. For the technical support of the engines, Minegas GmbH concluded an operation and maintenance contract with the supplier G.A.S which contains an emergency service. In case of downtimes of the monitoring equipment the electricity generated is not considered for emission reductions calculation.	OK
D. Internal Data *Identifying the internal GHG data sources and ways in which the data have been collected, calculated, processed, aggregated and stored should be part of initial verification to assess accuracy and reliability of the internal GHG data.*			

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
D.1. Type and sources of internal data *Acquire information on type and source of internal GHG data, which is used in calculations of emission reductions. E.g. "continuous direct measurements", "site-specific correlations", "periodic direct measurements", "use of models" and/or "use of default emissions factors".*	/MR/ /TÜV1/ /IM01/ /IM02/ /IM04/	The following internal parameters are obtained according to the monitoring plan: - Power output, direct measurement - CMM amount, direct measurement - CH_4-Concentration, direct measurement - business data The necessary action to ensure the data quality of the input measurements is given in FAR 2. All other Parameters were discussed in section C.4 of this protocol.	FAR 2
D.2. Data collection *How is data collected and processed? What are the means of quantifying emissions from the different data sources?*	/MR/ /IM01/ /IM02/ /IM04/ /TÜV1/	The measurements for the power in- and output as well as the data collected by Lambda and G.A.S were discussed in C.6 of this protocol. The analysis of the electrical efficiency was performed by an accredited organisation, according to the requirements given by this accreditation.	OK
D.3. Quality assurance *Does internal data collection underlie sufficient quality assurance routines?*	/IM01/ /IM02/ /IM04/ /TÜV1/	The quality assurance of the project activity is assessed to be very advanced as at least 3 companies are involved in similar tasks. This leads to several counterchecks of all data related to the monitoring. A consistency check for all measurement data is carried out by the Steag AG Energy Centre by	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
		validating the data. The efficiency analysis was carried out by an accredited institute Therefore the quality assurance procedures according to this accreditation apply.	
D.4. Significance and reporting risks *Assess the significance and reporting risks related to the different internal data sources. Potential reporting risks may be related to the calculation methods, accuracy of data sources and data collection and/or the information systems from which data is obtained. The significance of and risks associated with the data source indicate the level of verification effort required at a later stage.*	/MR/ /PDD/ /IM01/ /IM04/	The key parameter power output was measured by calibrated meters meeting the requirements of the German Weights and Measures Act. The quality of the installed direct CMM volume flow rate measurement was discussed in FAR 2. To ensure conservativeness the obtained values were only considered for plausibility check. All other parameters are of minor importance for the emission reduction calculation. The most important monitoring data (i.e. power output) is transmitted by a remote data transmission system. The meter readings were checked for plausibility by the responsible personnel of Minegas GmbH and Steag AG. The significance and reporting risks can therefore be assessed as low.	FAR 2

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
E. External Data *Especially for data of baseline emissions there might be the necessity to include external data sources. The access to such data and a proof of data quality should be part of initial verification. If it is deemed to be necessary, an entity delivering such data should be audited.*			
E.1. Type and sources of external data *Acquire information on type and source of external data, which is used in calculations of emission reductions*	/PDD/ /MR/ /TÜV1/ /IM03/	Additional parameters for the calculation of emission reductions, such as densities, calorific values, stoichiometric values and carbon emission factors were taken from publicly available sources. All applied values could be confirmed by the verification team.	OK
E.2. Access to external data *How is data transferred? How can reproducibility of data set be ensured?*	/PDD/ /VAL/	All applied external values were taken from publicly available sources. Therefore the reproducibility can be ensured.	OK
E.3. Quality assurance *Does external data underlie any quality assurance routines?*		As the applied values were taken from literature no further quality assurance is necessary.	OK
E.4. Data uncertainty *Is it possible to assess the data uncertainty of external data? Are such routines included in reporting procedures?*	/PDD/ /MR/	The data uncertainty can be assessed as very low.	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
E.5. Emergency procedures *Are there any procedures which will be applicable if there is no access to relevant external data?*		Not applicable	
F. Environmental and Social Indicators *A Monitoring Plan may comprise environmental and/or social indicators which could be necessary to monitor for the success of the project activity.*			
F.1. Implementation of measures *A project activity may demand for the installation of measures (e.g. filtering systems or compensation areas), which are exceeding the local legal requirements. A check of the implementation or realization of such measures should be part of the initial verification.*	/PDD/ /VAL/	The project meets the German environmental legislation like the Federal Immission Protection Law, the Environmental Impact Assessment Law and corresponding acts and regulations. Referring to the above mentioned legal requirements, no further measures are necessary.	OK
F.2. Monitoring equipment *Check where necessary whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.*		See F.1.	OK
F.3. Quality assurance procedures *What quality assurance procedures will be applied for such data?*		See F.1.	OK
F.4. External data *Check the quality, reproducibility and uncertainty of external data.*		See F.1.	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
G. Management and Operational System *In order to ensure a successful operation of a Client project and the credibility and verifiability of the ERs achieved, the project must have a well defined management and operational system.*			
G.1. Documentation *The system should be documented by manuals and instructions for all procedures and routines with relevance to the quality of emission reductions. The accessibility of such documentations to persons working on the project has to be secured.*	/IM01/ /IM02/ /IM04/	This issue was discussed in depth in Section C.8	FAR 3
G.2. Qualification and training *The system should describe the requirements on qualification and the need of training programs for all persons working on the emission reduction project. Performed training programs and certificates should be archived by the system.*		See C.9	OK
G.3. Allocation of responsibilities *The allocation of responsibilities should be documented in written manner.*	/IM02/ /IM04/	All responsibilities are clearly defined within the contractual agreements with G.A.S and Lambda.	OK
G.4. Emergency procedures *The system should contain procedures which provide emergency concepts in case of unexpected problems with data access and/or data quality.*		See C.11	OK

OBJECTIVE	Ref.	COMMENTS	Concl.(incl FARs/CARs/CRs)
G.5. Data archiving *The system should provide routines for the archiving of all data which is required for verifying the project's performance in the context of consecutive verifications.*		See C.7	OK
G.6. Monitoring report *The system includes procedures for the calculation of emission reductions and the preparation of the monitoring report.*	/IM03/ /IM04/	The Monitoring Report was prepared by Carbon TF. All necessary data was handed over by the operator of the plant.	OK
G.7. Internal audits and management review *The system includes internal control procedures, which allow the identification and solution of problems at an early stage.*	/IM01/ /IM02/ /IM04/	See C.8	FAR 3

Periodic Verification Checklist

Table 1: Data Management System/Controls

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
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.*	Full	The quality assurance of the project activity is assessed to be very advanced as at least 3 companies are involved in similar tasks. This leads to several counterchecks of all data related to the monitoring. Mr. Kaminski is the plant manager. He is responsible for the operation of the plant, as well as for the collection of the monitoring data except the power output, which is collected via remote data transmission. He is also responsible for the inspection of the measurement devices and of the initiation of the calibrations. He is the contact person for the operation and maintenance contractors G.A.S and Lambda as well as for the Energy Centre of the mother company Steag AG. The monitoring data regarding methane concentration, CMM amount and the power output was reported to Steag AG Energy Centre. Responsible person is Mr. Kummer. All data needed for the operation of the plant is transmitted to G.A.S and Lambda for operational surveillance and maintenance needs. The responsibilities are given within the

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
		contractual stipulations. All responsible personnel are skilled and have the relevant competencies needed for the GHG emission monitoring. The operational personnel are sufficiently trained to accomplish the necessary functions.
1.2. Responsibilities *Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.*	Full	See 1.1
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.*	Full	See 1.1
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.*	Partial	The PDD including the monitoring plan was validated against the JI requirement applicable for this kind of projects. The validation has resulted in a positive opinion. Due to contractual stipulations additional to the validated monitoring plan the CDM small scale methodology AMS III.D. was considered in this verification where it provides additional requirements for monitoring. The project implementation was discussed in detail in section C.1 of the initial verification checklist.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
2.2. Necessary Changes *Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.*	Partial	The necessary changes were discussed in the initial verification checklist in section C.1 and C.3 within the framework of FAR 2 and FAR3
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.*	Full	The considered output approach leads to lowest emission reductions and can therefore be assessed as conservative. For detailed information refer to 2.1
3.2. Information/process flow *An information/process flow diagram, describing the entire process from raw data to reported totals is developed.*	Full	The plant manager Mr. Kaminski is responsible for the collection of the raw data. The aggregation for weekly, monthly and annual reports is within the responsibility of Steag AG Energy Centre. All data was handed over to Carbon TF for the issuance of the monitoring report. The entire process is reproducible recorded in the operational journal, in the extranet system as well as in the business data.
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.*	Full	All measured monitoring data for the power output were recorded automatically with an IT supported remote data transmission and recording system. All other relevant data is collected by remote data transmission to G.A.S and by data carrier to Lambda. The systems store the data and can export into a spread sheet or generate hardcopies. All recorded data is checked for plausibility.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
3.4. Data trails *Requirements for documented data trails are defined and implemented and all documentation are physically available.*	Full	The requirements for documented data traceability are fulfilled due to the architecture of the IT-Systems.
4. Identification and maintenance of key process parameters		
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.*	Full	The key parameter with significant influence on the calculation of emission reductions is the power output. This parameter was measured with high accuracy by calibrated meters.
4.2. Calibration/maintenance *Appropriate calibration/maintenance requirements are determined.*	Full	The calibration/maintenance requirements are displayed in the monitoring report in section 5. The calibration of the power meters follows the requirements of the German Weights and Measures Act. The calibration of the flow meter and the gas analyser was periodically carried out by the personnel of Lambda.
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.*	Full	The estimations and the default data were discussed within the initial verification. For further Information see Section C.4 of the Initial verification checklist.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
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.*	Full	The quality assurance of the project activity is assessed to be very advanced as at least 3 companies are involved in similar tasks. This leads to several counterchecks of all data related to the monitoring.
5.3. Internal verification *Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.*	Full	See 5.2
5.4. Internal validation *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.*	Full	The relevant data for monitoring accrues only at the plant manager level. The data transferred to Steag AG Energy Centre was validated by responsible and competent personnel.
5.5. Data protection measures *Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).*	Full	The IT-supported database can only be accessed by entering a password and works only within the limitation of individual user authorisation. Only the responsible personnel of Steag AG and Minegas GmbH can get access. The internet interface allows reading access only. Modification of data is not possible using this front-end. Manual modification on the data can only be done by responsible personnel of Steag AG Energy Centre using defined computer terminals with limited access. These terminals are stored in a (normally) locked room. The data at Lambda and G.A.S can only be collected by a defined terminal stored in a locked room and passing

Expectations for GHG data management system/controls	Score	Verifiers Comments (including *Forward Action Requests*)
		password query. Only responsible personnel are able to transmit the data to the IT networks. These networks are protected with usual safety measures commonly used in company IT networks which contain sensible data.
5.6. IT systems *IT systems used for GHG monitoring and reporting should be tested and documented.*	Full	The IT systems base on standard PC with special technical software solutions. The IT Systems are tested and continuously administrated by the IT support departments of G.A.S, Lambda and Steag AG. The verification team was provided with sufficient evidence that the IT systems worked solidly during the whole monitoring period. The calculations of the emission reductions were checked by the verification team by using own spread sheets. These calculations have shown the same results as given in the monitoring report.

Periodic Verification Checklist

Table 2: GHG calculation procedures and management control testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
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.*
Raw data generation		
• Installation of equipment • Dysfunction of installed equipment • Maloperation by operational personnel • Downtimes of equipment • Exchange of equipment	• Installation of modern and state of the art equipment • Remote data transmission incl. status massages from the measurement devices • Regular visual inspections of installed equipment • Only skilled and trained personnel is allowed to operate the relevant equipment • Immediate exchange of dysfunctional equipment • Stand-by duty is organized • Maintenance contract with the manufacturer • Operation surveillance contract with an experienced company.	• Inadequate installation of the monitoring equipment. • Inadequate exchange of equipment. • Change of personnel • Undetected measurement errors

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
Raw data collection		
• Metering records • Operational log sheets • Calibration and maintenance data • Accuracies • Manuals and other manufacturer data • Accounting records • External measurements (electrical efficiency)	• Exclusive installation and operation of duly calibrated equipment • Cross-check of data by involved companies • Automatic data acquisition and redundant manual meter readings • Appropriate archiving system • Commissioning of external measurement institutes holding the corresponding accreditations • 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
Data aggregation		
• IT Systems • Spread sheet programming • Manual data transmission • Data protection • Responsibilities	• Clear allocation of responsibilities • Usage of advanced standard and technical software solutions • 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

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
Other calculation parameters		
• Data sources • Accuracies	• Exclusive consideration of well defined and generally accepted literature values and external measurements. • All used values applied are defined in the monitoring plan.	• No significant residual risks
Calculation Methods		
• Calculation approach • Applied formulae • Implemented IT Systems • Modifications of the IT Systems • Data storage • Lack of clarity in the monitoring plan	• Appropriate IT and archiving system • Usage of standard software • Implementation of data traceability procedures • Usage well tested Excel spread sheets	• The danger of miscalculation can only be minimized.
Monitoring reporting		
• Data transfer to the author of the monitoring report • Issuance of the monitoring report	• An experienced consultant was chosen • Integration of the consultant in all relevant monitoring issues • Usage of predefined tables in the monitoring report so that interfaces are minimised.	• The danger of data transfer mistakes can only be minimized

Periodic Verification Checklist

Table 3: Detailed audit testing of residual risk areas and random testing

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Raw data generation		
• Inadequate installation of the monitoring equipment. • Inadequate exchange of equipment. • Change of personnel • Undetected measurement errors	• On-site assessment • Evaluation of changes since commissioning or last on-site visit • Checking of personnel fluctuation • Plausibility checks • Inspection of calibration and maintenance records for key equipment	Evidence is required that the volume flow rate measurement meets the necessary accuracy requirements. If this evidence cannot be provided, an additional measurement has to be implemented. (FAR 2). Written procedures to define the monitoring processes and responsibilities are missing. (FAR 3) No other significant uncertainties or errors regarding the raw data generation were observed in the course of this verification.
Raw data collection		
• Unintended usage of old data that has been revised • Incomplete documentation • Ex-post corrections of accounting records • ambiguous sources of information	• Evaluation of the monitoring routines and practices • Review of the documentation on-site • Check of the accounting records • Plausibility checks to verify the information from different sources. • Discussions with process engineers who have detailed knowledge of process uncertainty / error bands	Written procedures to define the monitoring processes and responsibilities are missing. (FAR 3) No other significant uncertainties or errors regarding the raw data collection were observed in the course of this verification.

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Data aggregation		
• Manual data transfer mistakes • Unintended change of spread sheet programming or data base entries • Problems caused by updating/upgrading or change of applied software	• Sample cross checking of the information of the data base and the meter reading log • Spread sheet 'walk throughs' to check links and equations.	No other significant uncertainties or errors regarding the data aggregation were observed in the course of this verification.
Other calculation parameters		
• No significant residual risks	-	No significant uncertainties or errors regarding the other calculation parameters were observed in the course of this verification.
Calculation Methods		
• The danger of miscalculation can only be minimized.	• Recalculation	No significant uncertainties or errors regarding the calculation methods were observed in the course of this verification.

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Monitoring reporting		
• The danger of data transfer mistakes can only be minimized	• Cross checking of the information of the monitoring report and the original data made available at the on-site visit.	No significant uncertainties or errors regarding the monitoring reporting were observed in the course of this verification.