



**The World Bank
Carbon Finance Unit**

Determination on Monitoring Report
- for Year 2004 ~ 2007 -

**1st ~ 4th Periodic Determination on
Monitoring
of
Bulgaria Sofia District Heating Project**

May 29, 2008

JCI CDM Center

Report No. JCI-CDM-DOM-07-001

Revision No. 01

Date of first issue: May 20, 2008	Project No.: JCI-CDM-DOM-07-001
Approved by: YOSHIDA Akio	Organisational unit: JCI CDM Center
Client: World Bank Carbon Finance Unit	Client ref.:

Summary:

After the desk review of the monitoring report for the period from January 1st 2004 until December 31st 2007, prepared by Toplofikacia Sofia JSC, which was submitted to JCI on February 2, 2008, JCI Assessment Team has done the on-site assessment of the 1st ~ 4th periodic determination on monitoring at Toplofikacia Sofia JSC, Sofia CHP Site and Zemlyane Heat Plant, Sofia, Bulgaria during February 28 to February 29, 2008 for the Sofia District Heating Project.

The summary of this Periodic Determination on Monitoring through the on-site assessment is shown below and detailed in this report and the attachments.

1. It was confirmed that there were no remaining CARs and NIRs which have been addressed in the “Initial Verification Report”/7/.
2. Total Project Emissions reductions (tonnes CO_{2e}) :
Project Emissions reductions, amount **925,462 tonnes CO_{2e}** was determined appropriately for the period of January 1st 2004 until December 31st 2007, which is requested in the summary yearly results in the Data sheet of the Tracking Database Workbook of the monitoring report./4/

The yearly Project Emission Reductions are:

Year	ERs verified, t CO _{2e}
2004	148,953
2005	238,978
2006	275,321
2007	262,210
Total	925,462

3. Though one (1) CAR and three (3) CLARs were addressed as the findings through this periodic determination on monitoring, they were resolved appropriately and they are shown in Annex 1.

Report No.: JCI-CDM-DOM-07-001	Subject Group:	
Report title: 1 st ~ 4 th Periodic Determination on Monitoring of Bulgaria Sofia District Heating Project		
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Date of this revision: 29 May 2008	Rev. No.: Rev-01	Number of pages: 17

Indexing terms

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Abbreviations

AAU	Assigned Amount Unit
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CFU	Carbon Finance Unit, World Bank
CLAR	Clarification Request
CHP	Combined Heat and Power Plant
DHR	District Heating Region
EMS	Environment Management Plan
ER	Emission Reduction
ERU	Emission Reduction Unit
ERPA	Emission Reductions Purchase Agreement
FAR	Forward Action Request
GHG	Green House Gas
HOB	Heat Only Boiler
HP	Heat Plant
IE	Independent Entity
IETA	International Emission Trading Association
JCI	Japan Consulting Institute
MMS	Management and Monitoring System
MP	Monitoring Plan
PAD	Project Appraisal Document
PCF	Prototype Carbon Fund
PDD	Project Design Document
PT	Performance Test
QA	Quality Assurance
QC	Quality Control
RIOS	Regional Environmental Inspection
TOR	Terms of Reference
TS	Toplofikacia Sofia JSC
UNFCCC	United Nations Framework Convention for Climate Change

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1) Summary of On-site Assessment

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Annex 4 Monitoring Report (2004~2007) issued on 12 March 2008

Annex 5 Tracking Database Excel Workbook (2004~2007) issued on 1 April 2008

1 INTRODUCTION

As an Applicant Independent Entity (AIE), Japan Consulting Institute (JCI) performed the 1st~4th Periodic Determination on Monitoring of Bulgaria Sofia District Heating Project, receiving an order from CFU for the execution of a Periodic Determination on Monitoring on the project for the total period of 4 years - 2004~2007. This Periodic Determination on Monitoring is performed on the basis of TOR of CFU and currently valid conditions of CDM / JI stated in Kyoto Protocol, Marrakech Accords and the decisions of CDM Executive Board.

Assessment Team

Team Leader	:	SATO Hideyuki
Team Member	:	OKADA Masaki
Team Member	:	SAKAI Yoshihisa
Team Member	:	Vldamir Kanev
Local Expert	:	Todor Donchev

1.1 Objective

Objective of the Periodic Determination on Monitoring is to review and verify whether all the project activities are implemented as planned, and are in accordance with the latest version of the PDD, issued on October 22, 2007, i.e., all the physical features of the project including monitoring system are in place and fully functional, project has been operated smoothly without any serious trouble, monitoring of the data has been carried out fairly and monitoring data reflects and covers for the whole monitored period all requirements of the latest PDD, and the GHG data of high quality have been collected and reported as originally planned through the period of January 2004 to December 2007 under a risk management at sufficient level.

1.2 Scope

JCI has performed the Periodic Determination on Monitoring of the Bulgaria Sofia District Heating Project according to the requirement of CFU set as part of the MP for this specific project. Progress of the project, establishment and implementation of the quality assurance system and the procedures of data management / control system have been assessed on site in accordance with the IETA / PCF Validation and Verification Manual / Check List. The monitoring data and the result of the Tracking Database Workbook calculation prepared by Toplofikacia Sofia as the basis of the assessment of the Periodic Determination on Monitoring Report has also been reviewed. Additionally, this Periodic Determination on Monitoring is based on currently valid documentation of UNFCCC. In this context, the relevant documents are the "Marrakech Accord" and the decision of COP/MOP.

1.3 Description of the Project Activity

Project Parties:	Bulgaria, The World Bank CFU
Title of project activity:	Bulgaria, Sofia District Heating Project
Project Entity:	Toplofikacia Sofia AD District Heating Company
	23, Jastrebetz str.
	Sofia, Bulgaria
	TEL: +359 2 8593171
	E-mail address: amarkova@toplo.bg

Director: Ms. Anastasiya Markova

Location of the project activity: 1680 Sofia, Bulgaria

Outline of the Project

The aim of the project is to rehabilitate the district heating (DH) system in the city of Sofia by rehabilitating 60 km of pipes and replacement of pipe insulation (the total length of the DH system is 900 km), replacement of 10,000 substations, frequency control for the electric motors for the hot water supply pumps and installation of valves, compensators, heat exchanger and pumps, which supply heat to the individual consumers. The substations are being operated with modern controls and monitoring equipment that has resulted in increased operating efficiency of the DH system.

The goal of the project is to reduce heat losses and improve efficiency of the network so energy consumption will be reduced and to lower grid electricity consumption and hence reduce CO₂ emissions.

Those effects are planned to bring GHG emission reductions of total minimum 2,174,058 tonnes CO_{2e} as a result of the project activity through the project life, i.e., 2004 to 2012. (836,132 tCO_{2e} determined AAUs for the period 2004~2007 and 1,337,926 tCO_{2e} estimated ERU for 2008~2012)

2 METHODOLOGY

The IETA / PCF Validation and Verification Manual / Checklist are utilized to secure the transparency and credibility of the determination on monitoring. The Periodic Determination on Monitoring Checklist, reinforced with the additional items to cover the check points required to be verified specifically for the project, covers following items and helps the assessment team to perform the work with high degree of credibility.

Areas covered by the checklist

- (1) Required Basic data
- (2) Data Management System / Controls
- (3) GHG calculation procedures and management control testing
- (4) Detailed audit testing of residual risk areas and random testing

The Periodic Determination on Monitoring Checklist is utilized as follows

- (1) Systemizing, detailing and clarifying the conditions of Emission Reduction Purchasing
- (2) Securing the transparency of the determination on monitoring process on the documentation of the result.
- (3) Securing the credibility of the determination on monitoring based on the designated standard.

First of all, the desk review was performed based on the following monitoring report prepared by Toplofikacia Sofia which was submitted on February 2, March 12 and April 1, 2008.

- (1) The years 2004 ~2007 data according to the latest MP of the Project, including its new requirements
- (2) The result of the Tracking Database Workbook calculation

After the desk review, the On-site Assessment was performed.

Duration of the determination

Desk review: From February 2, 2008 to February 02, 2008

On-site Assessment: From February 28, 2008 to February 29, 2008

Reporting: From March 21, 2008 to May 20, 2008

2.1 Review of Documentation

Following documents and data are reviewed in order to verify the project activities at the desk review and the site.

- (1) Monitoring report
- (2) Organization Chart

- (3) Technological charts for distribution network, gas and heavy oil fuel supply and electricity generation/consumption and steam generation/distribution
- (4) Management Manual/Instructions
- (5) Calibration and maintenance record of key instruments
- (6) General information about operation of CHP, HP and HOB of TS
- (7) General information on data collection and billing from substations
- (8) Tracking Database Workbook
- (9) Actual operation results of CHP
- (10) Actual operation results of HP
- (11) Actual operation results of TS
- (12) Total amount of steam supplied for Heating
- (13) Total amount of generated electricity
- (14) Key input data
- (15) Manual input data
- (16) Training record of operators
- (17) Emergency plan

2.2 Site Visits

Assessment team has visited the site for On-Site Assessment from February 28 to February 29, 2008. The objectives of the assessment is to verify that the project is implemented, monitored and reported as planned.

The interviewed persons at the site are described in following Table 2.1 and the Summary of the On-site Assessment in Annex 2.

Table 2.1 List of Interviewed Persons

	Organization	Name of person	Title
Project Participant	Toplofikacia Sofia	Mr. Petko Milevski	Executive Director
		Peter Iliev	Deputy Executive Director
		Anastasiya Markova	PIU Manager, Director Electric and Heat Production
		Stefan Dochev	PCF Project Manager, Director
		Marina Popova	Head of Department
		Maria Domuzova	Specialist, Investment of Heat Sources
		Nikolai Kiyuvliev	Director of DHR, Zemlyane HP
		Nikolai Nikolov	Deputy Director of DHR, Director of HP Sofia
		Georgi Natskov	Director of CHP Sofia, Director of DHR
		Rumian Dimitrov	Deputy Director of DHR, Deputy Director of CHP Sofia

2.3 Assessment

The Assessment has been done as follows;

- (1) Investigation of whether all relevant equipment are operated properly, function as anticipated and are maintained fairly at randomly selected CHP Sofia, HP Zemlyane and gas supply station and heavy fuel oil supply station.
- (2) Confirmation that actual works for the Project have been executed and random check of substation execution and substation operation/maintenance/calibration
- (3) Confirmation of environmental and social impacts.
- (4) Interviews with the Project management, QA manager and operating and maintenance staffs.
- (5) Observations in order to check the risks for inappropriate operation and data collection procedures.
- (6) Reviews on information flows for generating, aggregating /collecting and reporting the selected monitored parameters.
- (7) Check the monitoring report/annual reports data and the relevant raw data.
- (8) Comparison with the data inputted in the Tracking Database Workbook prepared by the person is in charged input and the operation data collected by the operators.
- (9) Re-calculation of GHG emission reductions by using the Tracking Database Workbook attached in the MP and the monitoring report /Workbook submitted on February 2, 2008.
- (10) Check the evidence to be provided by the project owners that demonstrates that all metering equipments are calibrated.
- (11) Auditing of the required procedures, routines, and documentations to check their proper application.
- (12) Assessment of all the data collection, analysis and transmission procedures all along the chain from the project facilities to CFU, in order to ensure that CFU receives relevant, complete and synthetic information to execute payments under the confidential Emission Reductions Purchase Agreement.
- (13) Verification of FARs from the “Initial Verification Report”

2.4 Reporting of Findings

Findings established during the assessment may be that:

- i) the determination on monitoring is not able to obtain sufficient evidence for the reported emission reductions or part of the reported emission reductions. In this case these emission reductions shall not be verified and certified;
- ii) the determination on monitoring has identified material misstatements in the reported emission reductions. Emission reductions with material misstatements shall be discounted based on the verifier’s ex-post determination of the achieved emission reductions.

A Forward Action Requests (FAR) should be issued, where:

- the actual project monitoring and reporting practices requires attention and /or adjustment for the next consecutive determination on monitoring period, or
- an adjustment of the MP is recommended.

In the context of FARs, risks have been identified, which may endanger the delivery of high quality AAUs and ERUs in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the next consecutive determination on monitoring. A FAR may originate from lack of data sustaining claimed emission reductions.

A Corrective Action Requests (CARs) should be issued, where:

- mistakes are made with a direct influence on emission reductions amount
- there is an unacceptable risk as a project or a risk that the emission reductions cannot be verified.

A Clarification (CLARs) should be issued, where:

- additional information is required to clarify an issue sufficiently.

3 DETERMINATION ON MONITORING FINDINGS

3.1 Remaining Issues, CARs, FARs from Previous Validation or Verification

It was confirmed that there are no remaining CARs and CLARs, which had been addressed in the “Initial Verification Report” for TS, however one CAR for Letter of Approval by PCF as ANNEX 1 country is remaining.

3.2 Project Implementation

The following subjects were discussed.

- 1) Project implementation – execution of works and replacement of substations.
- 2) Operating and Maintenance conditions
- 3) Equipment conditions

No findings were addressed for the project implementation and equipment conditions.

The conclusions about evidence of maintenance conditions of electric meter are shown in the following **CAR-1** as indicated in the Annex 1 and Annex 2.

CAR - 1: Monitoring Report should be revised as a subsequence of the revising of the Tracking database due to the input mistakes. Monitoring Report should be reevaluated as a subsequence of the evaluation of uncertainty of the input data on gross electricity after the inspection of the meter.

CAR-1 was resolved and cleared by the record of ratio between generated electricity and consumption electricity 2004-2007/5/. (refer to Annex 1)

3.3 Completeness of Monitoring

The following subjects were discussed.

- 1) Changes of Monitoring parameters and data in comparison with the initial PDD and the latest version of the PDD on 22 October 2007 and availability of monitoring data as per the latest PDD and Tracking Database for the period from January 2004 up to the end of 2007. All data required by the latest PDD is available for the whole monitoring period.

All requirements fulfilled and no CARs, FARs and CLARs were addressed.

3.4 Accuracy of Emission Reduction Calculations

The following subjects were discussed.

- 1) Data input and data transfer procedures and input data errors
- 2) Tracking Database Worksheets and monthly and annual data calculations
- 3) Upgrading of the Tracking Database

The conclusion are shown in the following **CAR - 1 and CLAR - 1** as indicated in the Annex 1.

CAR - 1: Monitoring Report should be revised as a subsequence of the revising of the Tracking database due to the input mistakes. Monitoring Report should be reevaluated as a subsequence of the evaluation of uncertainty of the input data on gross electricity after the inspection of the meter. (refer to **3.2 Project Implementation**)

CLAR - 1: Supplementary monthly data gathering and calculation sheets should be provided to avoid input mistakes and to improve the traceability of the input data.

The details of **CLAR - 1** are shown in the following Table 3.1 and in the Annex 1.

Table 3.1 Detailed Items for CLAR - 1

(1)	Additional sheet to the Excel sheet named “Data”, where to record and calculate the monthly heat data and link them to the cells in the “Data” sheet.
(2)	Additional sheet to the Excel sheet named “Energy Saving Input Data”, where to record the monthly data that serves as base for the calculation for the annual data.

CLAR-1 was resolved and cleared by the revised Monitoring report, Tracking database and additional Excel sheets.

3.5 Quality of Evidence to Determine Emission Reductions

The following subjects were discussed.

- 1) Check of the input data, the operation data and the source data
- 2) Check of the daily log sheets and monthly records and digital data logs.

All requirements fulfilled and no CARs, FARs and CLARs were addressed.

3.6 Management System and Quality Assurance

The following subjects were discussed.

- 1) Organization chart, responsibilities and roles
- 2) Data flow diagrams
- 3) Reporting procedure
- 4) Management Manual and instructions
 - (i) Internal audits
 - (ii) Training program and records
 - (iii) Handling of the input data to the Tracking Database Workbook and the operation data/the source data
 - (iv) Change of the Management Manual and instructions

The conclusion are shown in the following **CLAR -2** and **CLAR - 3** as indicated in the Annex 1.

CLAR-2: Data flow chart, illustrating the Operational Instructions, clearly showing role and responsibilities for heat, electricity, fuel gas and oil data collection and reporting.

CLAR-3: Quality Control Manager is not assigned clearly for the Project. The input data should be checked and approved by the personal other than person in charge.

CLAR-2 and **CLAR-3** were resolved and cleared by the instructions provided by TS. (refer to Annex 1)

4 PROJECT SCORE CARD

Project Scorecard shows the conclusion of risk analysis for the Periodic Determination on Monitoring in the following Table 4.1.

Table 4.1 Project Score card

Objectives	Key aspects for Determination on Monitoring	Scope of Sampling	Results of data review	Conclusion
Emission Sources	Completeness	All sources	Monthly Protocols for all Emission sources during 2004 to 2007 are checked. 1) Heat Sold (Hot water) 2) Steam Sold 3) Generated Electricity 4) Gas Consumption 5) Oil Consumption 6) Makeup Water Generated electricity meters at CHP Sofia were with missing annual certification	OK Risk Level: LOW Or CAR – 1 Risk level LOW-Middium
Calculation Equation	Conformity	All Equations	All Equations are defined and protected in the excel sheet of Tracking database and therefore, the calculations are executed by the excel sheet of Tracking database.	OK Risk Level: LOW
Default Values, Emission Coefficients	Conformity	All values	All default values and Emission Coefficients are checked and confirmed the conformity with official published data.	OK Risk Level: LOW
	Accuracy	All values	Ditto	OK Risk Level: LOW
Monitored data	Accuracy	Sampling from all data	Monthly Protocols for all Monitored data during 2004 to 2007 are checked. Those data are the sum of hourly/daily data and are managed as commercial dealing purpose with cross checked. 1) Heat Sold (48 data) 2) Steam Sold (48 data) 3) Generated Electricity (48 data) 4) Gas Consumption (48	OK Risk Level: LOW-Middium

Objectives	Key aspects for Determination on Monitoring	Scope of Sampling	Results of data review	Conclusion
			data) 5) Oil Consumption (48 data) 6) Makeup Water (48 data)	
	Substantiality	Sampling from all data	Monthly Protocols for all Emission sources during 2004 to 2007 are checked. Hourly/Daily records are checked with sampling and obtained the copies of those. 1) Heat Sold (48 data) 2) Steam Sold (48 data) 3) Generated Electricity (48 data) 4) Gas Consumption (48 data) 5) Oil Consumption (48 data) 6) Makeup Water (48 data)	OK Risk Level: LOW
	Completeness	All data	Ditto	OK Risk Level: LOW
Calculation in the Monitoring Report	Accuracy	All calculation	2 errors for Heat sold, were found in the input data to the Tracking Database	CAR-1 OK Risk Level: Low-Medium
Numerical values in the Monitoring Report	Accuracy	All values	2 errors for Heat sold, were found in the input data to Tracking data base	CAR-1 OK Risk Level: Low-Medium

5 DETERMINATION ON MONITORING STATEMENT

Introduction

JCI has been engaged by the CFU to examine the greenhouse gas (GHG) emission reductions reported from Toplofikacia Sofia for the period January 1, 2004 to December 31, 2007, equating to 925,462 tonnes of CO₂ equivalents.

Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported for the stated period ended December, 2007.

Responsibilities of Toplofikacia Sofia and JCI

The management of the Toplofikacia Sofia JSC is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Determination on monitoring Plan dated October, 2007. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of Toplofikacia Sofia JSC.

It is JCI's responsibility to express an independent GHG verification opinion on the GHG emissions from the project for the period January 2004 ~ December 2007, which ended December, 2007 and on the calculation of GHG emission reductions from the project for the above period ended December, 2007 based on the verified emissions for the above period from January 1, 2004 until December 31, 2007.

Basis of GHG determination on monitoring opinion

JCI's determination on monitoring approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive Board/JI Supervisory Committee, COP/MOP.

JCI's approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. JCI's examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for the period from January 1, 2004 until December 31, 2007.

We planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of GHG emission reductions for the above period, prepared on the basis of the MP dated October 22, 2007, are fairly stated.

We conducted our determination on monitoring having regard to the Project Design Document Version 3 including Sofia District Heating Project's MP dated October 22, 2007. This assessment includes:

- collection of evidence supporting the reported data
- checking whether the provisions of the MP dated October 22, 2007, were consistently and appropriately applied

We have verified whether the information from Toplofikacia Sofia is current and has been correctly extracted from the Project Design Document. And we have verified whether the emissions reduction achieved has been determined correctly.

Opinion

Based on the information we have seen and evaluated.

It is our opinion that the amount of **925,462 tonnes of CO2 equivalents** indicated in the monitoring report during the period of January 1, 2004 to December 31, 2007 can be justified appropriately as the result of the Periodic Determination on Monitoring.

The emission reductions for each year verified

Monitoring Period	ERs verified, t CO2e
01.01.2004-31.12.2004	148,953
01.01.2005-31.12.2005	238,978
01.01.2006-31.12.2006	275,321
01.01.2007-31.12.2007	262,210
Total	925,462

6 REFERENCES

List of the Main Documents / Data provided by Toplofikacia Sofia is as follows.

/1/	PDD Version 3 (October 22, 2007)
/2/	Determination Report Revision 2 (February 11, 2008)
/3/	Monitoring Report (February 18, 2008) with Annex-Tracking database for 2004-2007
/4/	Revised Monitoring Report (March 12, 2008) with Annex-Tracking database for 2004-2007
/5/	Record of ratio between generated electricity and consumption electricity 2004-2007
/6/	ORDER (No.57/07.03.2008) regarding assignment of Quality Control Manager
/7/	Initial Verification Report by SGS (September 28, 2007)

List of the Main Documents / Data obtained during the on-site Assessment

	Refer to Annex 2 “Summary of On-Site Assessment”
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Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”**PERIODIC DETERMINATION ON MONITORING CHECKLIST****Introduction**

This document contains a generic Periodic Verification Checklist for **“1st-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”**, which is in relation to the Initial Verification Report.

This periodic Determination on Monitoring checklist ensures a transparent periodic Determination on Monitoring process to document how emission reductions have been verified and the conclusion that have been reached.

This checklist is used and viewed to make sure that the emissions/performance reporting system is in compliance with the project’s monitoring plan, and to identify all issues that may cause risk for material misstatement of emission reductions.

This checklist is prepared in accordance with the, “Validation and Verification Manual (VVM)”, given by IETA, but the list is customized specifically for the project by the verifier.

Table 1 Data Management System/Controls

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. The score in the Table 1 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.

Table 2 Summary of CARs and CLARs in Table 1**Appendix 1 Check for Basic Information of monitored data**

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
1. Defined organisational structure, responsibilities and competencies				
1.1. Position and roles <i>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.</i>	Partial	1) Position and role is indicated in Operational Instruction. English version of Operational Instruction, which is requested as Quality Management Manual to WB/CFU is provided.	OK	OK
		2) Data flow chart, illustrating the Operational Instructions, clearly showing role and responsibilities for heat, electricity, fuel gas and oil data collection and reporting.	CLAR-2	OK
		3) Quality Control Manager is not assigned clearly for the Project. The input data should be checked and approved by the personal other than person in charge.	CLAR-3	OK
1.2. Responsibilities <i>Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.</i>	Partial	Same as 1.1 - 1)	OK	OK
		Same as 1.1 – 2)	CLAR-2	OK
		Same as 1.1 – 3)	CLAR-3	OK
1.3. Competencies needed <i>Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required.</i>	Full	The training program was executed in accordance with the Regulation No.9. The records of training of staff were confirmed and copies are obtained.	OK	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
2. Conformance with monitoring plan				
2.1. Reporting procedures <i>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.</i>	Partial	1. Quality Control Manager should reflect the monitoring plan content, where deviations from the monitoring plan occur. Quality Control Manager is not clearly assigned for the Project management. (Same as 1.1 – 3))	CLAR-3	OK
2.2. Necessary Changes <i>Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.</i>	Full	It is confirmed that the current changes in Monitoring Plan are integrated in actual Monitoring System and the Tracking Database.	OK	OK
3. Application of GHG determination methods				
3.1. Methods used <i>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.</i>	Full	The Tracking Database which is provided and revised by PORY is used to determine GHG emissions in appropriate manner.	OK	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
3.2. Information/process flow <i>An information/process flow diagram, describing the entire process from raw data to reported totals is developed.</i>	Partial	(Same as 1.1 – 2))	CLAR-2	OK
3.3. Data transfer <i>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.</i>	Partial	<p>1) Input data to the Tracking Database was checked and traced based on the monthly Protocol records with all data of electric power, Heat sold, and gas/oil consumption, and data of makeup water.</p> <p>Two errors were found in input data including pre-calculation.</p> <p>Monitoring Report should be revised as a subsequence of the revising of the Tracking database due to the input mistakes.</p> <p>Monitoring Report should be reevaluated as a subsequence of the evaluation of uncertainty of the input data on gross electricity after the inspection of the meter.</p>	CAR-1	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
		2) Supplementary monthly data gathering and calculation sheets should be provided to avoid input mistakes and to improve the traceability of the input data. (1) Additional sheet to the Excel sheet named “Data”, where to record and calculate the monthly heat data and link them to the cells in the “Data” sheet. (2) Additional sheet to the Excel sheet named “Energy Saving Input Data”, where to record the monthly data that serves as base for the calculation for the annual data.	CLAR-1	OK
3.4. Data trails <i>Requirements for documented data trails are defined and implemented and all documentation are physically available.</i>	Partial	Same as 3.3-1), 2)	CAR-1 CLAR-1	OK
4. Identification and maintenance of key process parameters				
4.1. Identification of key parameters <i>The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.</i>	Full	It is confirmed that the key physical process parameters are identified because the Tracking Database sheet is used in appropriate manner.	OK	OK
4.2. Calibration/maintenance <i>Appropriate calibration/maintenance requirements are determined.</i>	Full	It is confirmed that the calibration/maintenance requirements are determined in appropriate manner by the Certification records.	OK	OK
5. GHG Calculations				

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
5.1. Use of estimates and default data <i>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.</i>	Full	It is confirmed that the default data are used and determined in appropriate manner by the official records.	OK	OK
5.2. Guidance on checks and reviews <i>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.</i>	Partial	1. The input mistake is not checked by the personal other than person in charge. 2. Systematical checking procedure for input data is not established. 3. Quality Control Manager is not assigned for the Project. (Same as 1.1 – 2), 3))	CLAR-3	OK
5.3. Internal verification <i>Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.</i>	Partial	Same as 5.2 (1.1 – 2) , 3))	CLAR-3	OK
5.4. Internal validation <i>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.</i>	Full	It is confirmed that the data reported from internal departments was validated by signature by an employee with the evidential documents.	OK	OK
5.5. Data protection measures <i>Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).</i>	Full	It is confirmed that the protection measures for the Tracking Databases is in place in appropriate manner. Access restrictions are managed by password.	OK	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
5.6. IT systems <i>IT systems used for GHG monitoring and reporting should be tested and documented.</i>	Full	It is confirmed that the GHG monitoring data is managed by the computer logging system in appropriate manner.	OK	OK
6. Management and Operational System <i>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.</i>				
6.1. Emergency Procedure <i>The system should contain procedures which provide emergency concepts in case of unexpected problems with data access and/or data quality.</i>	Full	It is confirmed that the emergency procedure is established based on the request of the Initial Verification Report.	OK	OK
6.2. Data Archiving <i>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.</i>	Full	It is confirmed that the data archiving procedure including CD Disk backup system is established at onsite assessment and based on the request of the Initial Verification Report.	OK	OK
6.3. Monitoring Report <i>The system includes procedures for the calculation of emission reductions and the preparation of the monitoring report.</i>	Partial	Same as 3.3	CAR-1	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
6.4. External Audit	Full	It is confirmed that the TS have the external audits from the State Energy and Water Regulation Commission (SEWRC) and for finance audit including technical operational data. In addition, all monthly data submitted as protocol/statement are cross checked. Therefore data handling work and the monthly protocol records of TS is basically evaluated as processed in reliable manner.	OK	OK
7. Environmental and Social Effects <i>A Monitoring Plan may comprise environmental and/or social indicators which could be necessary to monitor for the success of the project activity.</i>				

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 1 Data Management System/Controls			Draft Con- clusion	Final Con- clusion
Expectations for GHG data management system/controls	Score	Verifiers Comments		
7.1. Implementation measures <i>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.</i>	Full	<p>The Sofia District Heating System Rehabilitation Project required an Environmental management plan and public hearing on it. The permission on the management plan was granted on 20. 02. 2002 and after announcement in the press, the public hearing was carried out on April 2, 2003. The environmental issues concern mainly dust emissions and wastes during construction works.</p> <p>In addition to it Toplofikatsia Sofia EAD had an external Environmental Audit Report and Environmental Action Plan published on May 3, 2002, concerning the same environmental issues and achievements. There is no negative public reaction, concerning the Project.</p> <p>The Joint Implementation Project does not address environmental issues or concerns, however being part of the Toplofikatsia Sofia District Heating Rehabilitation Project, the environmental goals and public opinion have been checked and verified as adequate.</p>	OK	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Table 2 Summary of CARS and CLARs in Table-1

CAR/CLAR	Project Participants Response	Verifiers Comments	Conclusion
<p>CAR-1</p> <p>Input data to the Tracking Database was checked and traced based on the monthly Protocol records with all data of electric power, Heat sold, and gas/oil consumption, and data of makeup water.</p> <p>Two errors were found in input data including pre-calculation. Monitoring Report should be revised as a subsequence of the revising of the Tracking database due to the input mistakes.</p> <p>Monitoring Report should be reevaluated as a subsequence of the evaluation of uncertainty of the input data on gross electricity after the inspection of the meter.</p>	<p>The revised Monitoring Report as well as the Tracking Database has been submitted on March 12, 2008.</p>	<p>It was checked and confirmed that the revised Monitoring Report as well as the Tracking Database were corrected appropriately.</p> <p>CAR-1 was cleared and closed.</p>	OK
<p>CLAR-1</p> <p>Supplementary monthly data gathering and calculation sheets should be provided to avoid input mistakes and to improve the traceability of the input data.</p> <ol style="list-style-type: none"> 1) Additional sheet to the Excel sheet named “Data”, where to record and calculate the monthly heat data and link them to the cells in the “Data” sheet. 2) Additional sheet to the Excel sheet named “Energy Saving Input Data”, where to record the monthly data that serves as base for the calculation for the annual data. 	<p>The Excel sheet named “Data”, where to record and calculate the monthly heat sold and the Excel sheet named “Energy Saving Input Data”, where to record the monthly data added in the Tracking Database work book sheets have been submitted on May 9, 2008.</p>	<p>It was confirmed that those additional Excel sheets were provided in the Tracking Database workbook appropriately.</p> <p>CLAR-1 was cleared and closed.</p>	OK

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

CAR/CLAR	Project Participants Response	Verifiers Comments	Conclusion
<p>CLAR-2:</p> <p>Flow chart including role and responsibilities of heat, fuel gas and oil for the Project is not clearly documented in Operational Instruction.</p>	<p>The flow chart has been provided on March 13, 2008.</p>	<p>It was confirmed that the flow chart was appropriate.</p> <p>CLAR-2 was cleared and closed.</p>	<p>OK</p>
<p>CLAR-3:</p> <p>Quality Control Manager is not assigned clearly for the Project. The input data should be checked and approved by the personal other than person in charge.</p>	<p>The order No.57, dated 7 March, 2008 was submitted, in which Ms. Velichka Gramatikova is assigned as responsible person for internal quality control of the Project.</p>	<p>CLAR-3 is cleared and closed by the order No.57, dated 7 March, 2008.</p>	<p>OK</p>

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

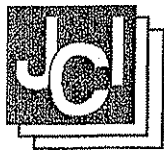
Appendix 1 Check for Basic Information of monitored data

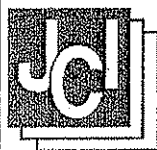
Objectives	Key aspects for Determination on Monitoring	Scope of Sampling	Results of data review	Conclusion
Emission Sources	Completeness	All sources	Monthly Protocols for all Emission sources during 2004 to 2007 are checked. 1) Heat Sold (Hot water) 2) Steam Sold 3) Generated Electricity 4) Gas Consumption 5) Oil Consumption 6) Makeup Water	OK Risk Level: LOW
Calculation Equation	Conformity	All Equations	All Equations are defined and protected in the excel sheet of Tracking database and therefore, the calculations are executed by the excel sheet of Tracking database.	OK Risk Level: LOW
Default Values, Emission Coefficients	Conformity	All values	All default values and Emission Coefficients are checked and confirmed the conformity with official published data.	OK Risk Level: LOW
	Accuracy	All values		OK Risk Level: LOW
Monitored data	Accuracy	Sampling from all data	Monthly Protocols for all Monitored data during 2004 to 2007 are checked. Those data are the sum of hourly/daily data and are managed as commercial dealing purpose with cross checked. 1) Heat Sold (48 data) 2) Steam Sold (48 data) 3) Generated Electricity (48 data) 4) Gas Consumption (48 data) 5) Oil Consumption (48 data) 6) Makeup Water (48 data)	OK Risk Level: LOW-Middium

Annex 1 Checklist for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”

Objectives	Key aspects for Determination on Monitoring	Scope of Sampling	Results of data review	Conclusion
	Substantiality	Sampling from all data	Monthly Protocols for all Emission sources during 2004 to 2007 are checked. Hourly/Daily records are checked with sampling and obtained the copies of those. 1) Heat Sold (48 data) 2) Steam Sold (48 data) 3) Generated Electricity (48 data) 4) Gas Consumption (48 data) 5) Oil Consumption (48 data) 6) Makeup Water (48 data)	OK Risk Level: LOW
	Completeness	All data	Ditto	OK Risk Level: LOW
Calculation in the Monitoring Report	Accuracy	All calculation	2 errors for Heat sold, were found in the input data to the Tracking Database	CAR-1 , OK Risk Level: Low-Medium
Numerical values in the Monitoring Report	Accuracy	All values	2 errors for Heat sold, were found in the input data to Tracking data base	CAR-1 OK, Risk Level: Low-Medium

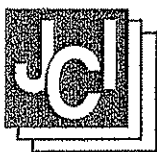
Annex 2

 <div> 1st -4th Periodic Monitoring Determination under the JI Summary of On-Site Assessment </div>	
Project Name	Bulgaria Sofia District Heating Project
Duration for the On-site Survey	February 28 – February 29, 2008
Place	1. Meeting Room of Toplofikacia Sofia Office 2. On-site Survey in Sofia CHP Station Site and Zemliane Heating Plant Site
Verification Team	JCI CDM Center / Hideyuki Sato/ Team Member Masaki Okada/ Team Member Vladimir Kanev /Team Member Todor Georgiev Donchev/ Bulgarian Expert Emilia Veselinova Peneva/Assistant Team Member
Project Participant	Toplofikacia Sofia JSCo/ Peter Iliev/ Deputy Chief Executive Anastasiya Markova / PIU Manager, Director Electric and Heat Production Stefan Dochev/ PCF Project Manager, Director Marina Popova/ Head of Department Maria Domuzova/Specialist, Investment of Heat Sources Toplofikacia Sofia JSCo/ Zemlyane HP Nikolai Kiyuvliev/Director of DHR Nikolai Nikolov/Deputy Director of DHR, Director of HP Toplofikacia Sofia JSCo/ Sofia CHP Georgi Natskov/Director of DHR Rumian Dimitrov/Deputy Director of DHR, Director of CHP
Stake holders	Toplofikacia Sofia JSCo
Findings by Verification Team	
<p>Verification(Monitoring Determination) Team has done the On-site Assessment of 1st-4th (2004-2007)Periodical Verification at Toplofikacia Sofia (TS) Site, Bulgaria during February 28 – 29, 2008 for the Bulgaria Sofia and Pernik District Heating Project.</p> <p>The summary of the findings by the Verification Team through the On-site Assessment are shown below.</p> <ol style="list-style-type: none"> 1. It was confirmed that there are no remaining CARs and NIRs which have been addressed in Initial Verification Report for TS, however one CAR for Letter of Approval by PCF as ANNEX I country is remaining. 2. The TS is 42% Government owned, and 58% Municipal City owned Company. 	



1st -4th Periodic Monitoring Determination under the JI Summary of On-Site Assessment



3. The work procedure for TS is regulated by the 16 Governmental Regulations, among that, No.9 for technical operation of electrical power and grid, and No16-334(ex No.2) for Heat Supply issued by Ministry of Economy & Energy, are the most related regulation for the project implementation.
4. TS have the external audits from the State Energy and Water Regulation Commission (SEWRC) and for finance audit including technical operational data. In addition, all monthly data submitted as protocol/statement are cross checked. Therefore data handling work and the monthly protocol records of TS is basically evaluated as processed in reliable manner.
5. As for the Project work procedure for data collection, processing and recording for the DH Project are provided by the Operational Instruction issued by TS as of 2004, and revised on 2007. However the Operational Instruction is not provided with the data flow sheet including role and responsibilities of heat, electricity, gas fuel and oil data collection for the Project.
6. Total Project Emissions reductions (tones CO₂e) ;
 - 1) All data of electric power, Heat sold, Gas/oil consumption, and makeup water Input data to Tracking database were checked and traced by the monthly Protocol records. As the result of the data check, two errors in input data were found including pre-calculation. Accordingly, the Monitoring Report as well as Tracking database are requested to be revised and resubmitted as shown in below CARs.
 - 2) It is confirmed that the inspection of electricity meter for gross generating power in Sofia CHP, of which data is used for the input data of the Project calculation, is not executed in appropriate manner for the Project. Accordingly, Project Emissions reduction amount requested in the monitoring report should be reevaluated, until the confirmation of the data of inspection/calibration would be submitted after the onsite assessment. In addition, preparation of the excel data sheet identifying the relational data between gross electricity and commercial electric meter for sold and purchased is requested for evaluation of uncertainty of the input data.
 - 3) Consequently, Project Emissions reduction amount requested in the monitoring report was not verified.
7. CARs (Corrective Action Requests) and CLARs (Clarifications) are addressed as the findings through the 1st-4th Periodical Verification for TS are shown in below.
 - 1) CAR-1: Monitoring Report should be revised as a subsequence of the revising of the Tracking database due to the input mistakes.
Monitoring Report should be reevaluated as a subsequence of the evaluation of uncertainty of the input data on gross electricity after the inspection of the



**1st -4th Periodic Monitoring Determination
under the JI
Summary of On-Site Assessment**

meter.

- 2) CLAR-1: Supplementary monthly data gathering and calculation sheets should be provided to avoid input mistakes and to improve the traceability of the input data.
 - (1) Additional sheet to the Excel sheet named "Data", where to record and calculate the monthly heat data and link them to the cells in the "Data" sheet.
 - (2) Additional sheet to the Excel sheet named "Energy Saving Input Data", where to record the monthly data that serves as base for the calculation for the annual data.
- 3) CLAR-2: Data flow chart, illustrating the Operational Instructions, clearly showing role and responsibilities for heat, electricity, fuel gas and oil data collection and reporting.
- 4) CLAR-3: Quality Control Manager is not assigned clearly for the Project. The input data should be checked and approved by the personal other than person in charge.

Signature of Project representative	Date	Signature Leader of Verification Team	Date
 A. Markova	29.02.2008		29.02.2008

Main Documents/Data List obtained during the On-site Assessment

No.	Documents	Obtained from
1.	Letter of approval of Bulgaria for Sofia DH Project	TS (Toplofikacia Sofia)
2.	Brochure of Sofia District Heating Company	TS
3.	Organization Chart of TS	TS
4.	Organization Chart of Sofia CHP and Zemliane in 4 District region of TS	TS
5.	General arrangement Drawing, Central Scheme of CHPP	TS
6.	Layout Drawing for Sofia CHP station	TS
7.	Schematic Diagram of Heat balance sheet for Sofia CHP plant	TS
8.	Scheme of dislocation of the heat transmission network	TS
9.	Single line Diagram of Sofia CHP plant	TS
10.	Regulation NO.16-334 from April 6, 2007 for Heat Supply, published OG No.34 ad 24.04.2007, issued by Ministry of Economy & Energy (Old version of Regulation No.2)	TS
11.	Operational Instructions for the Project in English version as of 2004 for Method of data collection, processing and recording related to produced, sold and purchased electricity.	TS
12.	Operational Instructions for the Project in English version as of 2004 for Method of data collection, processing and recording related to Mazut Monthly consumption in Toplofikacia Sofia AD.	TS
13.	Operational Instructions for the Project in English version as of 2004 for Method of data collection, processing and recording related to Natural Gas Monthly consumption in Toplofikacia Sofia AD.	TS
14.	Operational Instructions for the Project in English version as of 2004 for Method of data collection, processing and recording related to Heat energy Generation and sale.	TS
15.	Order No. 358 Sofia 7.12.2001 for assignment of PIU for the Rehabilitation Project	TS
16.	Order No. 486 /05.11.2004 for establishment of Working Group for the Project	TS
17.	Order No. 12/14/.01.2008 for assignment of change of PIU staff for the Project	TS
18.	Order No. 39/18/.02.2008 for assignment of change of working Team member for the Project	TS
19.	Contract between National Electricity Co. Ltd. and TS JDCo for electricity sale to TS dated on 10 December 2003, and for electricity sale to NEC dated 12 January 2007	TS

No.	Documents	Obtained from
20	Contract between Electrozapredelenie Stolicno JDCo and TS JDCo for electricity sale to ES dated 10 December 2003	TS
21	Contract between Bulgar Gas JDCo and TS JDCo for natural Gas supply dated on 29.12.1998	TS
22	Contract between Lukoil Bulgaria Ltd. and TS JDCo for Heavy Fuel Oil dated on 19 09 2006 and 15 02 2007	TS
23	General Terms of TS for Heat Supply	TS
24	The record of external Audit by SEWRC for Heat quantity and claims from customer, etc	TS
27	Monthly Statement Records for the supply of Natural Gas by Bulgargas EAD the period from January 2004 and December 2007 (12Month * 4years=48 Sheets)	TS
28	Protocol for execute education recording "Operation and maintenance of block customer station, Bruterm" dated 9 April 2004	TS
29	Training records, List of operation and maintenance of automatic system for operating the water flow rate of power station "Lulin" dated 9 April 2004	TS
30	Typical Schematic diagram, Scheme of indirect substation with heating and one stage domestic hot water heat exchanger	TS
31	Typical Schematic diagram, Indirect substation with heating and one stage domestic hot water heat exchanger	TS
32	Instruction for the work execution of Project "Rehabilitation of District Heating system"	TS
33	Certification of the electric meter of gross electricity for Sofia East CHP (for #1 , #2, #4, #5)	TS
34	Daily Operational read out record sheet, Night and Day Information, Zernlyane Heat Plant #6,	TS
35	Daily Operational read out record sheet, Night and Day Information, Heat and Power station in Sofia, 12. 11. 2007	TS
36	Record of Training, Execution instruction of the personnel	TS

Annex 3 Photo book for "1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria"



Photo-1 Cooling Tower of Sofia CHP (Co-generation Power Plant)



Photo-2 Operation Room of Sofia CHP



Photo-3 Electric meter of Sofia CHP



Photo-4 Pump Station of Sofia CHP

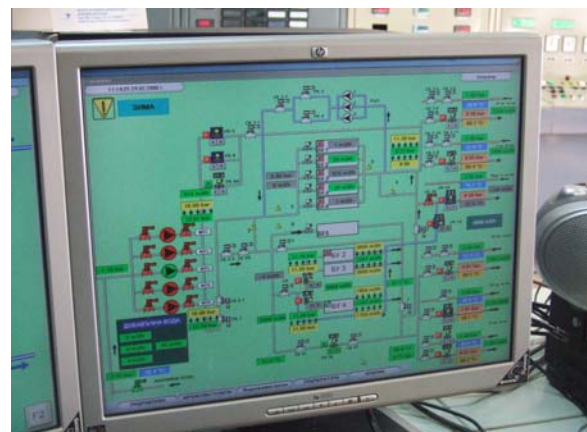


Photo-5 Display of plant operation of Sofia CHP

Annex 3 Photo book for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”



Photo-6 Gas firing boilers and Stacks in Sofia CHP



Photo-7 Gas flow meter for boiler in Sofia CHP



Photo-8 Heat supply Sub-station in the residential apartment house



Photo-9 Heat meter in the Sub-station

Annex 3 Photo book for “1ST-4th Periodic Determination on Monitoring of Sofia District Heating Project in Bulgaria”



Photo-10
Stack of Zemlyane HP
(Heat Plant)



Photo-11 Operation room of Zemlyane HP



Photo-12 Heat meter of Zemlyane HP



Photo-13 Heat supply pipe of
Zemlyane HP

Annex 4

To:

MR. SUDIPTO SARKAR

IBRD

1818 H STREET N.Y.

WASHINGTON, D.C. 20433

USA

MR. KARI HAMEKOSKI

CARBON FINANCE UNIT (ENVCF), MC4-782

The World Bank

1818 H STREET N.Y.

WASHINGTON, D.C. 20433

USA

Copy:

MR. ORLIN DIKOV

World Bank, Sofia Office

36 Dragan Tzankov Blvd.

Bulgaria, Sofia 1040

Re: PCF – JI Monitoring Report for year 2004-2007

Joint Implementation Monitoring Report, Prototype Carbon Fund SOFIA DISTRICT HEATING PROJECT

Date: 12.03.2008

Sofia

Monitoring periods

01.01.2004-31.12.2004,

01.01.2005-31.12.2005,

01.01.2006-31.12.2006,

01.01.2007-31.12.2007.

Project

The aim of the project is to rehabilitate the DH system in the city of Sofia by (i) replacing 60 km of pipelines and (ii) 10000 substations in order to reduce energy generation and GHG emissions at two combined heat and power plants and two heat only boilers in Sofia, Bulgaria. Further background on this project can be found in the Project Design Document available at: www.carbonfinance.org.

Monitoring

The basis for the calculation of emission reductions is the monitoring section of PDD. It is based on the JI specific approach using relevant JI Guidelines. The project has been positively determined by TÜV SÜD Industrie Service GmbH

Calculation methodology

Emission reductions were calculated using Tracking Database based on the following formula: $ER_y = BE_y - PE_y$

Where:

BE_y is the total baseline emissions in year y (tCO_{2e}) based consumption of heavy fuel oil and natural gas in year y for gross heat and power generation based on the historical correlation of energy generated and fuels used.

PE_y is the total project emissions in year y (tCO_{2e}) based on project emissions in year y resulting from the heavy fuel oil and natural gas combustion for gross heat and power generation by the DH system.

Results are adjusted by the expected infrastructure improvements in the baseline case and electricity savings due to more efficient pumps.

Monitoring results

The calculated emission reductions from 01.01.2004 to 31.12.2007, inclusively are **925,462 tCO_{2e}**.

Monitoring Period	ERs, (t CO_{2e})
01.01.2004-31.12.2004	148,953
01.01.2005-31.12.2005	238,978
01.01.2006-31.12.2006	275,321
01.01.2007-31.12.2007	262,210
Total	925,462

ANNEX: TRACKING DATABASE FOR 2004-2007

PETKO MILEVSKY
Executive Director

Annex 5

TRACKING DATABASE FOR 2004-2007

Toplofikacia Sofia

Month	Year	Nat. Gas million m3	Hvy. Fuel Oil (Tons)	Elec. Prod MWh	Heat Sold MWh	Base Fuel GJ	Baseline kg-CO2e	Project kg-CO2e	Reduction kg-CO2e	Notes
1	2004	148.326	4947	152391	943623	5577988	316420521	291291794	25,128,727	
2	2004	118.974	3708	141315	734821	4451633	252264843	232822011	19,442,832	
3	2004	102.198	2812	133579	606878	3767330	213293364	198828640	14,464,724	
4	2004	46.811	621	63738	235818	1734481	97779617	88946689	8,832,928	
5	2004	30.974	76	43175	157207	1261669	70936520	57777259	13,159,261	
6	2004	19.235	15	18334	91189	778106	43504071	35723500	7,780,571	
7	2004	22.453	51	24168	104651	886337	49642495	41828106	7,814,388	
8	2004	23.489	60	26537	105783	904475	50663558	43785488	6,878,071	
9	2004	25.213	62	28627	114703	965372	54123955	47003014	7,120,941	
10	2004	30.806	74	37812	144792	1172063	65857410	57458191	8,399,219	
11	2004	85.896	2648	87300	538500	3209035	181718347	167959696	13,758,650	
12	2004	117.679	3976	118679	739393	4364166	247402815	231230384	16,172,432	
Tot		772.054	19,050	875,655	4,517,358	29,072,653	1,643,607,517	1,494,654,773	148,952,744	

Month	Year	Nat. Gas million m3	Hvy. Fuel Oil (Tons)	Elec. Prod MWh	Heat Sold MWh	Base Fuel GJ	Baseline kg-CO2e	Project kg-CO2e	Reduction kg-CO2e	Notes
1	2005	125.797	4226	116927	833361	5007947	284116258	246846181	37,270,078	
2	2005	120.59	4081	104200	812254	4833120	274219000	236696664	37,522,335	
3	2005	103.948	3232	99167	670638	4052532	229743171	203076607	26,666,564	
4	2005	59.6	1259	71963	339952	2293113	129583536	114371896	15,211,640	
5	2005	30.959	47	38669	150181	1234113	69390307	57274881	12,115,426	
6	2005	27.334	68	34337	126629	1085915	60965014	50582647	10,382,366	
7	2005	16.008	62	10589	78690	684004	38216323	29453921	8,762,402	
8	2005	24.21	63	26826	106604	934667	52383294	44744556	7,638,738	
9	2005	25.73	63	28783	120842	1026318	57597790	47577659	10,020,131	
10	2005	39.738	359	45965	202940	1533838	86438304	74593872	11,844,432	
11	2005	88.278	3023	94727	574386	3528845	199910747	173229186	26,681,562	
12	2005	113.786	3842	117998	746911	4552511	258144663	223282513	34,862,149	
Tot		775.978	20,325	790,151	4,763,388	30,766,924	1,740,708,406	1,501,730,583	238,977,823	

Annex 5

Month	Year	Nat. Gas million m3	Hvy. Fuel Oil (Tons)	Elec. Prod MWh	Heat Sold MWh	Base Fuel GJ	Baseline kg-CO2e	Project kg-CO2e	Reduction kg-CO2e	Notes
1	2006	138.183	4690	124407	872589	5459534	309821308	270998710	38,822,598	
2	2006	109.888	3610	98522	720968	4488974	254629499	214917340	39,712,159	
3	2006	95.98	2900	102603	613008	3908423	221508148	186802136	34,706,012	
4	2006	49.238	668	61896	277428	2015236	113796438	92785219	21,011,220	
5	2006	31.756	73	39398	146715	1253528	70493213	58357058	12,136,155	
6	2006	27.86	65	34758	124833	1108594	62255672	51066475	11,189,197	
7	2006	23.755	58	26812	107710	968896	54334869	43389173	10,945,696	
8	2006	23.613	59	23902	102540	923148	51742662	43127408	8,615,254	
9	2006	25.693	62	25728	117450	1021530	57341676	47015814	10,325,862	
10	2006	47.453	744	46944	258811	1853223	104641972	89689188	14,952,784	
11	2006	88.294	2750	95836	562627	3601665	204056262	172007842	32,048,420	
12	2006	115.547	3994	117829	744887	4716665	267504461	226648671	40,855,791	
Tot		777.260	19,673	798,635	4,649,566	31,319,415	1,772,126,181	1,496,805,034	275,321,147	

Month	Year	Nat. Gas million m3	Hvy. Fuel Oil (Tons)	Elec. Prod MWh	Heat Sold MWh	Base Fuel GJ	Baseline kg-CO2e	Project kg-CO2e	Reduction kg-CO2e	Notes
1	2007	103.914	3326	123183	648276	4223263	239344697	201241460	38,103,237	
2	2007	96.123	2915	124215	580739	3855354	218363480	185441674	32,921,805	
3	2007	86.214	2611	123213	500628	3422689	193701537	166017675	27,683,862	
4	2007	45.239	3925	76729	235133	1891459	106657829	93584105	13,073,724	
5	2007	33.958	699	54638	135257	1269099	71296984	62636094	8,660,890	
6	2007	30.053	642	50328	114715	1129610	63368072	55174020	8,194,052	
7	2007	24.031	303	32808	99826	953370	53416648	42896281	10,520,367	
8	2007	22.085	522	26397	97671	908501	50893877	39936618	10,957,259	
9	2007	27.969	575	41669	113940	1082588	60734900	51079483	9,655,418	
10	2007	49.473	1007	57694	276690	1998254	112851392	92533860	20,317,532	
11	2007	107.833	3283	147064	641184	4300738	243630234	208422894	35,207,340	
12	2007	128.98	4096	166909	792146	5243926	297294744	250379842	46,914,902	
Tot		755.872	23,904	1,024,847	4,236,205	30,278,851	1,711,554,397	1,449,344,007	262,210,389	

Petko Milevsky
/Executive Director/