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Verification Report

Danish Energy Agency

Fourth Periodic Verification of the Project

"Energy Efficiency Improvement of the District Heating System in Drobeta Turnu-Severin"

under JI Track 1(RO1000133)

Monitoring period:

From 01-01-2011 to 31-12-2011

Report No. 600500876

18 December 2012

TÜV SÜD Industrie Service GmbH
Carbon Management Service
Westendstrasse 199 - 80686 Munich - GERMANY

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Report No.	**Date of first issue**	**Version No.:**	**Revision date**	**No. of pages**
600500876	18-12-2012	01	-	21 (without cover page and annexes)
Subject:	Fourth Periodic Verification under JI Track 1			
Executing Operational Unit:				
TÜV SÜD Industrie Service GmbH, Carbon Management Service Westendstrasse 199 - 80686 Munich, Federal Republic of Germany				
Project Participant (client):				
1. (Buyer of credits and client of TÜV SÜD) Ministry of Climate and Energy Danish Energy Agency Amaliegade 44 DK-1256; Copenhagen K; Denmark 2. (Project owner) ROMAG TPP				
Registration number / Project Title	RO1000133 / "Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin"			
Monitoring period:	01-01-2011 to 30-09-2011 and 01-10-2011 to 31-12-2011			
First Monitoring Report (version/date)	Version 01 / 06-03-2012 (MR 4.1 and MR 4.2)			
Final Monitoring Report (version/date)	Version 06 / 05-12-2012 (MR 4.1 and MR 4.2)			

Summary:

TÜV SÜD Industrie Service GmbH has performed the fourth periodic verification of the registered JI Project under JI Track 1 project: "Energy efficiency improvement of the district heating system in Drobeta Turnu Severin". This is in total 5th verification that has been conducted for this project. The project consists of 38 heat conversion substations connected to the secondary network of the Drobeta Turnu-Severin district heating system operated by ROMAG TERMO PP. As per registered JI PDD, the total length of the secondary networks pipe is approximately 190 km including heating and hot portable water distribution. Heat to the network is provided by the ROMAG TERMO PP CHP plant that is equipped with 6 boiler units and 6 turbines. The management of ROMAG TERMO PP is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions.

A document review, followed by a site visit was conducted to verify the information submitted by the project participant regarding the present verification period. Based on the assessment carried out, the verifier confirms the following:

- the project has been implemented and operated in accordance with the description given in the approved and registered JI PDD (version 08, 07/11/2009) with slightly modification in fuel input by addition of biomass as additional fuel (1.5%) from this fourth periodic verification and is in line with the project specific approach (IRL#30) .
  http://ji.unfccc.int/JIITLProject/DB/09PG38GL1EVUCD8D8JUNQEI4RPHUVJ/details
- the project is completely implemented as described in the JI PDD.
- the monitoring plan complies with the project specific methodology (described in the registered JI PDD, see above) and the monitoring has been carried out in accordance with the monitoring plan.

Installed equipment essential for generating emission reductions run reliably and the meters are calibrated appropriately. The project is generating emission reductions as a JI track 1 project.

The GHG emission reductions are calculated without material misstatements. Our opinion refers to the project's GHG emissions and resulting GHG emission reductions reported, both determined using the valid project's baseline, its monitoring plan and its associated documents.

The PP has split the Monitoring period of 2011 into two sub-periods: (i) from 01-01-2011 to 30-09-2011 to cover the remaining volume of ERUs generated by the JI Project Activity up to the total amount of 293,285 tCO_2e, which has been allocated by the Romanian Ministry to the JI Project for the crediting period from 2008-2012 and (ii) from 01-10-2011 to 31-12-2011 for the emission reductions above this limit. A possibility of exceeding of limit set by Romanian NAP is also excluded as clearly stated in §8 of the LoA from the Romanian DFP.

Based on the information we have seen and evaluated, we confirm that the implementation of the project resulted in 44 474 tCO_2e of emission reductions (ERUs) during the verification period 01-01-2011 to 30-09-2011 and 32 582 tCO_2e of emission reductions (ERUs) during the verification period 01-10-2011 to 31-12-2011. This makes it in total 77 056 tCO2e for year 2011. In the registered JI PDD, it has been estimated that the annual ERs would be approximately 83 868 tCO_2e. The lower value of ERUs from 2011 is a result of a higher thermal efficiency of the power plant by operating mostly in combined heat and power (CHP) process.

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Based on the information we have seen and evaluated, we confirm the following statement:

	Total from 01-01-2011 to 31-12-2011	**Sub-period from 01-01-2011 to 30-09-2011**	**Sub-period from 01-10-2011 to 31-12-2011**
Baseline Emissions:	**494 417 t CO_{2e}**	**298 921 CO_{2e}**	**195 496 CO_{2e}**
Project Emissions:	**417 361 CO_{2e}**	**254 447 CO_{2e}**	**162 914 CO_{2e}**
Total Emission Reductions:	**77 056 CO_{2e}**	**44 474 CO_{2e}**	**32 582 CO_{2e}**

Assessment Team Leader: Nikunj Agarwal	**Technical Reviewer:** Robert Mitterwallner, Thomas Kleiser
Assessment Team Member: Madis Maddison (Verifier)	**Certification Body responsible:** Thomas Kleiser

Abbreviations

ACM	Approved Consolidated Methodology
AIEs	Accredited Independent Entities
CAR	Corrective Action Request
CDM-EB	CDM Executive Board
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO_2e	Carbon dioxide equivalent
CR / CL	Clarification Request
DEA	Danish Energy Agency
DFP	Designated Focal Point
DVM	Determination and Verification Manual (Annex 4 JISC 19)
EF	Emission Factor
EIA / EA	Environmental Impact Assessment / Environmental Assessment
ERUs	Emission Reduction Units
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
KP	Kyoto Protocol
LoA	Letter of Approval
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-Governmental Organisation
PDD	Project Design Document
PP	Project Participant
TÜV SÜD	TÜV SÜD Industrie Service GmbH
UNFCCC	United Nations Framework Convention on Climate Change
VP	Verification Protocol

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Main Documents (referred to in this report)

Methodology (name / version)	N/A	
Scope	3 (Energy demand)	
Technical Area	3.1 (Heat and Steam efficiency)	
Registered PDD:	version 08, 07/11/2009	
	Version	Date
Published Monitoring Report	01 (MR 4.1 and MR 4.2)	06-03-2012 (MR 4.1 and MR 4.2)
Revised Monitoring Report	06 (MR 4.1 and MR 4.2)	05-12-2012 (MR 4.1 and MR 4.2)
Project documentation link:	http://www.netinform.de/KE/Wegweiser/Guide22.aspx?Ebene2_ID=2053&mode=5	

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1 INTRODUCTION

1.1 Objective

Danish Energy Agency has commissioned an independent verification by TÜV SÜD Industrie Service GmbH (TÜV SÜD) of its registered JI track 1 project: "Energy efficiency improvement of the district heating system in Drobeta Turnu Severin".
The objective of the verification work is to comply with the requirements of paragraph 62 of the JI guidelines. According to this assessment TÜV SÜD shall:

- ensure that the project activity has been implemented and operated as per the registered PDD "Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin" (version 08, 07/11/2009), and that all physical features (technology, project equipment, monitoring and metering equipment) of the project are in place,
- ensure that the published MR and other supporting documents provided are complete, verifiable and in accordance with applicable JI requirements,
- ensure that the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology,
- evaluate the data recorded and stored as per project specific methodology.

1.2 Scope

The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the Accredited Independent Entity. The verification is based on the submitted monitoring report, the determined project design documents including its monitoring plan and determined report, the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and the JISC and any other information, references and national regulations relevant to the project activity's resulting emission reductions. These documents are reviewed against the requirements of the Kyoto Protocol, the JI Modalities and Procedures and related rules and guidance as well as against requirements as described in the Romanian National Guidelines and Procedures for JI Track 1 projects.

Based on the requirements in the JI DVM, TÜV SÜD has applied a rule-based approach for the verification of the project. The principles of accuracy, completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion.

The verification considers both quantitative and qualitative information on emission reductions.
The verification is not meant to provide any consultancy towards the client. However, stated requests for clarifications, corrective and/or forward actions may provide input for improvement of the monitoring activities.

1.3 GHG Project Description

Project activity:	"Energy efficiency improvement of the district heating system in Drobeta Turnu Severin"
UNFCCC registration number:	RO1000133

Project Participants:	ROMAG TPP, Regia Autonoma pentru Activitati Nucleare – RAAN – project owner represented by the Director GABRIEL BALACI Danish Energy Agency, Danish Ministry of Climate and Energy represented by Inge Gerhardt Pedersen, Chief Programme Coordinator for Romania
Location of the project:	Latitude 44.67375°, Longitude 22.6883°
Date of registration as Track 1:	02-04-2010 (after redetermination of TÜV SÜD)
Starting date of the JI crediting period:	01-01-2008

After ROMAG TPP took over the district heating system from the municipality in 2003, the power plant initiated a number of activities in order to improve the overall efficiency of heat and hot portable water supply to consumers.

The JI Track 1 project activity focuses on the heat conversion part of the heat conversion substations and the secondary district heating network for supply of heat and hot portable water. In this context the project includes the redesign of the secondary district heating network and a subsequent replacement of in total approximately 215 km of heat and hot portable water pipes by new pre-insulated district heating pipes. Moreover the project comprises the installation of 114 new heat exchangers in 38 heat conversion substations located within the secondary district heating network. In connection with the rehabilitation work, heat metering devices have been installed at the heat conversion substation to meter the heat and hot portable water consumption side.

The district heating network rehabilitation project reduces heat and water losses within the secondary district heating network and the heat conversion substations connected to primary network. Buttom up this leads to the fuel consumption reduction at the ROMAG – TERMO CHP power plant and effects a reduction of the annual greenhouse gas emissions of the coal fired plant.

Besides greenhouse gas emission reductions, there is expected to be a decrease of local dust and particle pollution from lignite transportation and combustion in association with the proposed project activity.

2 METHODOLOGY

2.1 Verification Process

The verification process is based on the approach depicted in the Validation and Verification Manual.
Standard auditing techniques have been adopted for the verification process. The verification team performs first a desk review, followed by an on-site visit, which results in the formation of a protocol that includes all the findings. The next step involves the evaluation of the findings through direct communication with the PPs and then finally the preparation of the verification report. This verification report and other supporting documents then undergo an internal quality control by the CB "climate and energy" before submission to Danish Energy Agency.

2.2 Verification Team

The appointment of the verification team takes into account the technical area(s), sectoral scope(s) and relevant host country experience required amongst team members for verifying the ER achieved by the project activity in the relevant monitoring period for this verification.
The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL);
- Verifier (V);
- Verifier Trainee (T);
- Technical Expert (TE).

The verification team consisted of the following members who both were also on-site:

Name	Qualification	Coverage of scope	Coverage of technical area	Host country experience
Nikunj Agarwal	**ATL**	☑	☑	☑
Madis Maddison	GHG-V			☑

Technical Reviewers: **Robert Mitterwallner, Thomas Kleiser.**

2.3 Review of Documents

The Monitoring Reports for both sub-periods version 01 submitted by the PP on 16/03/2012 and was assessed based on all the relevant documents as listed above. The aim of the assessment in the desk review was to:

- verify the completeness of the data and the information presented in the MR,
- check the compliance of the MR with respect to the monitoring plan depicted in the registered PDD. Particular attention to the frequency of measurements, the quality of the metering equipment including calibration requirements, and the quality assurance and quality control procedures was paid,
- evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

A complete list of all documents reviewed is available in annex 2 of this report.

2.4 On-site Assessment and follow-up Interviews

On 05-06-2012, TÜV SÜD performed a physical site inspection and on-site interviews with project stakeholders to:

- confirm the implementation and operation of the project,
- review the data flow for generating, aggregating and reporting the monitoring parameters,
- confirm the correct implementation of procedures for operations and data collection,
- cross-check the information provided in the MR documentation with other sources,
- check the monitoring equipment against the requirements of the JI PDD including calibrations, maintenance etc.
- review the calculations and assumptions used to obtain the GHG data and ER,
- identify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters.

A list of the persons interviewed during this verification activity is included in annex 2.

2.5 Quality of Evidence to Determine Emission Reductions

Among several evidence items submitted, the following relevant and reliable evidence material have been used by the audit team during the verification process:

1. JI PDD "Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin, Version 08 (IRL#1).
2. Monitoring Plan, Guidelines and Procedures(IRL#4)
3. Previous verification report (Report no 600500556) (IRL#5)
4. Calibration and validity permits for steam and heat metering system (IRL#7)
5. Management and monitoring system (IRL#9)
6. Determination of fuel parameters (IRL##10, 12 and 17)
7. Training evidences (IRL#14)
8. JI Process Data log sheet (IRL#16)
9. LEA Reports (IRL#18)
10. Summary of fuel consumption (IRL##22, 23 and 24)
11. Revised final monitoring reports for 2011, version 5 (IRL#26)
12. Latest excel sheets of emission reduction calculation sheet for 2011, version 5 (IRL#27)

Sufficient evidence covering the full verification period in the required frequency/completeness is available to validate the figures stated in the final revised monitoring report. The sources of the evidences are discussed in chapter 3 of this report. Specific cross-checks have been done in cases that further sources were available. The monitoring report's figures were checked by the audit team against the raw data. The data collection system meets the requirements of the monitoring plan as per the project specific methodology.

2.6 Resolution of Clarification and Corrective and Forward Action Requests

The objective of this phase of the verification process is to resolve any outstanding issues which require clarification for TÜV SÜD's positive conclusion of the achieved GHG emission reduction. The findings raised as Forward Action Requests (FARs) (if any) indicated in previous reports

(determination/verification) were discussed during communications between the PP and TÜV SÜD.
To guarantee the transparency of the verification process, the concerns raised in the desk review, the on-site audit assessments and the follow up interviews together with the responses that have been provided by the PP are documented in Annex 1 (verification protocol).

A Corrective Action Request (CAR) is raised where TÜV SÜD identifies:

- non-conformities in monitoring and/or reporting with the monitoring plan and/or JI PDD;
- that the evidence provided is not sufficient to prove conformity;
- mistakes in assumptions, data or calculations that impair the ER;
- FARs stated during determination that are not solved until the on-site visit.

A Clarification Request (CR) is raised where TÜV SÜD does not have enough information or the information is not clear in order to confirm a statement or data.

A Forward Action Request (FAR) is raised where TÜV SÜD identifies that monitoring and/or reporting require special attention or adjustments for the next verification period.

Information or clarifications provided as a response to a CAR, CL or FAR can also lead to a new CAR.

2.7 Internal Quality Control

As a final step of verification, the final documentation including the verification report and annexes have to undergo an internal quality control by the Certification Body (CB) "climate and energy", i.e. each report has to be finally approved either by the Head of the CB or the Deputy (a Veto person and /or Expert fully independent from the project and the verification process can be further linked to the review). In case one of these two persons is part of the assessment team, the approval can only be given by the person who is not a part of the assessment team. If the documents have been satisfactorily approved, the Final Verification Report is submitted to the Danish Energy Agency along with the relevant documents.

3 VERIFICATION RESULTS

In the following sections, the results of the verification are stated. The verification results relate to the project performance as documented and described in the final JI PDD and final revised Monitoring Reports 4.1 and 4.2 (05-12-2012, version 06). The verification findings for each verification subject are presented below:

3.1 FARs from Previous Verification

There were one FAR raised in previous verification and the verification team confirms that FAR presented in the third periodic verification report has been correctly addressed by the PPs. For more details please see the chapter 4 and annex 2.

3.2 Project Implementation in accordance with the Project Design Document

The project was implemented modular in several phases since October 2006, finished before the end of the year 2007. When finishing a relevant phase this part is completely operational. The project is fully implemented according to the description presented in the registered JI PDD since December 2007 to till December 2009.

The project includes the redesign of the secondary district heating network and a subsequent replacement of in total approximately 215 km of heat and hot portable water pipes by new pre-insulated district heating pipes. Moreover the project comprises the installation of 114 new heat exchangers in 38 heat conversion substations located within the secondary district heating network.

Up from March 2010, the project has been slightly modified by using biomass as additional fuel type. It was verified during third audit in 2011 when AIE concluded that there is no need for re-determination of the project.

Except above issue, the verifier confirms, through the visual inspection, that all physical features of the proposed JI project activity including data collecting systems and storage have been implemented in accordance with the JI PDD, MP. The project activity is completely operational since finalizing the last phase in December 2007.

There is no difference between the values of the data and/or variables presented in the MR and the stated data in the JI PDD except with above one issue. During on-site audit and spot check some data source is missing or there were not enough evidences and hence CAR and CR were issued to clarify it and also asked to present evidences for cross-check and verify via CAR and CR.

By the end of 2011 in total 2582 consumers were connected to the district heating system, 857 consumers to the primary network and 1725 consumers to the secondary network during last periodic verification. During this periodic verification total 143 consumers were added.

The estimated ERs in the registered JI PDD with annual 83.868 tCO_2e meet the ERs really achieved in 2007. The estimation in the registered JI PDD was used as reference for judging of the annual ERs during the crediting period of the project.

In the monitoring period 2011 the result with 77 056 t CO_2e ERs is lower than it was estimated in the approved PDD due to a result of a higher thermal efficiency of the power plant by operating mostly in combined heat and power (CHP) and demand was also lower (due to good weather that year).

3.3 Compliance of the Monitoring with the Monitoring Plan

The monitoring of data has been carried out in accordance with the Monitoring Plan contained in the JI PDD MP and monitoring plan of the energy efficiency improvement of the district heating system in Drobeta Turnu-Severin. All parameters were monitored and determined as per the Monitoring Plan.
The verification of the parameters required by the Monitoring Plan is provided as follows:

Data / Parameter:	$Q_{P,DH,primary}$
Data unit:	Gcal
Description:	District heat supplied to the primary network
Source of data used:	Recordings in logbooks are archived in paper form, the values of the daily reports are put into an excel spreadsheet prepared for one month. The project relevant data of one month are summarized in a JI Process Data Log Sheet. The equipment used has been calibrated according to the requirements of the approved monitoring plan.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports and related samples of daily records issued by the Heat Production Department. Some discrepancies were found but they were corrected by PP (CAR2). As a result all data are consistent to the calculation tool and used in the calculation Excel sheets.
Cross-check	The parameter that can be used for plausibility crosscheck is the calculated system efficiency of primary network in the Monitoring Excel Spreadsheet Tool. The efficiency is related to total amount of heat delivered to the primary network.

Data / Parameter:	$Q_{P,ps}$
Data unit:	Gcal
Description:	Process steam produced for heavy water producers
Source of data used:	Continuous measuring system transferring data hourly to the TPP central control room (digital). Data were also manually recorded in the logbook and logged for the day The equipment used has been calibrated according to the requirements of the approved monitoring plan.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Heat Production Department. Some discrepancies were found but they were corrected by PP (CAR3). As a result all data are consistent to the calculation tool and used in the calculation Excel sheets.
Cross-check	Calculation can be crosschecked by monthly or annual heat balances between fuel consumption and total heat production considering the thermal efficiency of the boilers.

Data / Parameter:	$Q_{P,DH,HCS}$
Data unit:	Gcal
Description:	District heat supplied to heat conversion substations (HCS)
Source of data used:	Data are collected manually and automatically, acquired and stored with the

	SCADA-System, every hour and logged for the day. The equipment used has been calibrated according to the requirements of the approved monitoring plan.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool.
Cross-check	Calculation can be crosschecked with the heat supplied to consumers considering the efficiency of HCS.

Data / Parameter:	$Q_{P,DH,pr.con}$
Data unit:	Gcal
Description:	District heat supplied to consumers connected to the primary network
Source of data used:	Data are collected manually monthly.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool. Approved monthly reports for the full monitoring period have been supplied
Cross-check	Calculation can be crosschecked with the general heat balance of power plant and supplied networks.

Data / Parameter:	$Q_{P,DH,secondary}$
Data unit:	Gcal
Description:	District heat supplied to secondary network
Source of data used:	Data are collected manually and automatically, acquired and stored with the SCADA-System, every hour and logged for the day.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool. Approved monthly reports for the full monitoring period have been supplied
Cross-check	Calculation can be crosschecked with the heat supplied to single consumers connected to the heat conversion substations (HCS).

Data / Parameter:	$Q_{P,DH,consumers}$
Data unit:	Gcal
Description:	District heat supplied to consumers connected to the secondary network
Source of data used:	Data are collected manually monthly, stored in the accounting system of the District Heat Department and provided to the JI-Department.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool. Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.
Cross-check	Calculation can be crosschecked with the heat supplied to secondary network considering the efficiency of the secondary network.

Data / Parameter:	$Q_{P,DH,pr.new\_con}$
Data unit:	Gcal
Description:	District heat supplied to new consumers connected to the primary network

Source of data used:	Data are collected manually monthly, stored in the accounting system of the District Heat Department and provided to the JI-Department..
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool. Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied. New customers will be separately monitored and documented as foreseen in the registered PDD. The separate accounting of new consumers is done with the contract management system. Additional new consumers have been connected during the monitoring period 2011.
Cross-check	Calculation can be crosschecked with the balance of total heat supplied to primary network considering the efficiency of primary network.

Data / Parameter:	$Q_{P,DH,\text{sec.}new\_con}$
Data unit:	Gcal
Description:	District heat supplied to new consumers connected to the secondary network
Source of data used:	Data are collected manually monthly, stored in the accounting system of the District Heat Department and provided to the JI-Department.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool. Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied. New customers will be separately monitored and documented as foreseen in the registered PDD. The separate accounting of new consumers is done with the contract management system. Additional new consumers have been connected during the monitoring period 2011.
Cross-check	Calculation can be crosschecked with the balance of total heat supplied to secondary network considering the efficiency of secondary network.

Data / Parameter:	$cv_{P,lignite}$
Data unit:	Kcal/kg
Description:	Net calorific value of lignite
Source of data used:	Onsite analysis manufacturer stored at the ROMAG TPP laboratory and provided to the JI-Department.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department. No discrepancies were found and all data are consistent to the calculation tool. The responsible JI-Project management and the staff of the ROMAG TPP laboratory was interviewed during audit how sampling and analysing processes are conducted. The calibration of the equipment was checked onsite the ROMAG TPP laboratory by certificates. The procedures are well implemented and the accreditation of the ROMAG TPP laboratory is in process.
Cross-check	A second analyse from each delivery is made by ROMAG TPP laboratory. In case of a deviation a backup witness sample will be analysed by both. Net calorific value of lignite is one component for the calculation of the boiler applied fuel heat. The general energy balance of the power plant that is done anyway gives the possibility of crosscheck in combination with the amount of fired lignite.

Data / Parameter:	$cv_{P,oil}$
Data unit:	Kcal/kg
Description:	Net calorific value of oil
Source of data used:	Onsite analysis manufacturer stored at the ROMAG TPP laboratory and provided to the JI-Department.
Means of verification/Comments:	Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department. No discrepancies were found and all data are consistent to the calculation tool. The responsible JI-Project management and the staff of the ROMAG TPP laboratory was interviewed during audit how sampling and analysing processes are conducted. The calibration of the equipment was checked onsite the ROMAG TPP laboratory by certificates. The procedures are well implemented and the accreditation of the ROMAG TPP laboratory is in process.
Cross-check	Net calorific value of fuel oil is one component for the calculation of the boiler applied fuel heat. The balances of the boilers, only fired with oil, give the possibility of crosscheck in combination with the amount of fired oil.

Data / Parameter:	$V_{P,lignite}$
Data unit:	T
Description:	Quantity of lignite consumed
Source of data used:	Invoices, weight sheets, stock survey, stored at the technical department and provided to the JI-Department.
Means of verification/Comments:	The total amount of delivered lignite is weighted by deliverer and invoiced. Incoming waggons are weighted by weigh-bridge for check. Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department and single consumption sheets for each month. No discrepancies have been found and all data are consistent to the calculation tool.
Cross-check	The amount of consumed lignite is one component for the calculation of the boiler applied fuel heat. The general energy balance of the power plant that is done anyway gives the possibility of crosscheck in combination with the net calorific value of lignite.

Data / Parameter:	$V_{P,oil}$
Data unit:	T
Description:	Quantity of oil consumed
Source of data used:	Invoices, weight sheets, tank level, stored at the technical department and provided to the JI-Department.
Means of verification/Comments:	The total amount of delivered oil is weighted by deliverer and invoiced. Incoming waggons are weighted by weigh-bridge for check. Monthly mass balances are representative in accordance with the produced and measured heat. Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department and single consumption sheets for each month. No discrepancies have been found and all data are consistent to the calculation tool.
Cross-check	The amount of consumed oil is one component to calculate the fuel heat applied by the boiler. The balances of the boilers, only fired with oil, give the possibility of crosscheck in combination with the net calorific value of fired oil.

Data / Parameter:	$V_{P,biomass}$

Data unit:	T
Description:	Quantity of biomass consumed
Source of data used:	Invoices and weight sheets stored at the technical department and provided to the JI-Department.
Means of verification/Comments:	The total amount of delivered oil is weighted by deliverer and invoiced. Incoming waggons are weighted by weigh-bridge for check. Monthly mass balances are representative in accordance with the produced and measured heat. Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department and single consumption sheets for each month. No discrepancies have been found and all data are consistent to the calculation tool.
Cross-check	The amount of consumed biomass is one component for the calculation of the boiler applied fuel heat. The general energy balance of the power plant that is done anyway gives the possibility of crosscheck in combination with the net calorific value of biomass.

Data / Parameter:	$CV_{P.biomass}$
Data unit:	Kcal/kg
Description:	Net calorific value of biomass
Source of data used:	Onsite analysis manufacturer stored at the ROMAG TPP laboratory and provided to the JI-Department.
Means of verification/Comments:	Certificates for the NCV for the full monitoring period have been provided. These documents were checked with monthly reports issued by the Technical Department. No discrepancies were found and all data are consistent to the calculation tool. The NCV is determined by a third party accredited laboratory based on the samples taken on the site by the ROMAG TERMO staff.
Cross-check	N/A. The share of biomass in total fuel is less than 1.5% and therefore absence of cross-check does not influence on the final calculation result.

3.4 Assessment of Data and Calculation of Greenhouse Gas Emission Reductions

All data have been available and all the parameters have been monitored in accordance with the monitoring plan. The reported data have been cross-checked against other sources available as explained above in chapter 3.3. First version of excel spreadsheets (IRL#3) were also cross-checked in detail. The audit team found some minor inconsistencies in the excel sheets. The PPs were asked to correct them. The PPs have submitted the new excel sheets with corrections (IRL#27). The data collection, transfer and processing were checked in detail along with the calculations within the excel sheets and found correct. The final monitoring reports and other support documents provided (invoices, measurement records, emission reduction calculation) are complete and transparent. All figures in the revised monitoring reports (IRL#26) were cross-checked by the audit team using the final excel spreadsheets. There were no gaps in data reporting.

The verifier confirms that the methods and formulae used to obtain the baseline, project and leakage emissions are appropriate except in minor changes in input fuel from March 2010 (see paragraph 3.2 Project Implementation in accordance with the Project Design Document).

Further, the verifier confirms that all the emission factors and default values (ex-ante values from PDD) have been correctly justified. All the emission factors and default values are explicitly mentioned in the monitoring report.

4 SUMMARY OF FINDINGS

The verifier can confirm that the MR and related documents are complete and verifiable in accordance with the JI Track 1 requirements. All the findings raised by the verification team, the responses by the PPs and the conclusion from the team are presented in Annex 1. The means of verification and resulting changes in the MR or related documents are identified in the following table:

CAR 1: Information about phased implementation of pipe re-placement programme is missing from MR. Provide information.
CAR 1, means of verification
The PP has submitted copies of relevant Final Acceptance Reports and was checked by audit team against note taken during on-site audit.
CAR 1, changes in the MR or related documents
The MR and other related documents have been updated accordingly.

CAR 2: Data for District heat supplied to primary network in monthly reports issued by the JI-Department are not consistent to the calculation tool. Correct inconsistency.
CAR 2, means of verification
The PP has revised calculation tools and same has been submitted to audit for cross-check. The audit verified it against documents and found correct.
CAR 2, changes in the MR or related documents
The calculation tool files were updated accordingly.

CAR 3: Data for Process steam production in monthly reports issued by the JI-Department are not consistent to the calculation tool. Correct inconsistency.
CAR 3, means of verification
The PP has revised calculation tools and same has been submitted to audit for cross-check. The audit verified it against documents and found correct.
CAR 3, changes in the MR or related documents
The calculation tool files were updated accordingly.

CAR 4: Units in the excel sheet "Heat and Steam_Monthly Calculation Methodology_2011.xls" are missing. Include units.
CAR 4, means of verification
The PP has revised excel sheet and same has been submitted to audit for cross-check. The audit found it correct.
CAR 4, changes in the MR or related documents
The excel file "Heat and Steam_Monthly Calculation Methodology_2011.xls" has been updated accordingly.

CAR 5: The Monitoring period indicated on calculation sheet is inconsistent with MR No: 4.
CAR 5, means of verification
The PP has revised MR and same has been submitted to audit for cross-check. The audit found it correct.
CAR 5, changes in the MR or related documents
The MR has been revised accordingly.

CAR 6: In calculation tool the cells containing project formulae are not locked to avoid unintentional typing errors. Lock cells containing formulae and unlock only the input fields.

CAR , means of verification
The PP has locked cells containing formulae in excel sheet and same has been submitted to audit for cross-check. The audit found it correct.
CAR 6, changes in the MR or related documents
The calculation tool files were locked accordingly.

CAR 7: Add the explanation to MR why there are two monitoring periods and two MRs for 2011.
CAR 7, means of verification
The PP has revised MRs and same has been submitted to audit for cross-check. The audit found it correct.
CAR 7, changes in the MR or related documents
The MRs have been revised accordingly.

CAR 8: Include dates of last revision of each monitoring proce-dure in Description of monitoring methods and equipment in both Monitoring Reports.
CAR 8, means of verification
The PP has revised MR and same has been submitted to audit for cross-check. The audit found it correct.
CAR 8, changes in the MR or related documents
The MRs have been revised accordingly.

CAR 9: In both Monitoring Reports chapter 6.2 states that no adjustments of monitoring methods and equipment were not necessary. However it is not consistent with the fact that combustion of biomass is used up from 2010 which was not foreseen in the registered PDD. Correct MR-s!
CAR 9, means of verification
The PP has revised MR and same has been submitted to audit for cross-check. It was checked by audit team against note taken during on-site audit.
CAR 9, changes in the MR or related documents
The MRs have been revised accordingly.

CAR 10: Correction Action Request#10. In both Monitoring Reports the Verifier's company name is not stated correctly. The correct name is TÜV SÜD Industrie Service. Correct the error.
CAR 10, means of verification
The PP has revised MR and same has been submitted to audit for cross-check. The audit found it correct.
CAR 10, changes in the MR or related documents
The MRs have been revised accordingly.

CR 1: Provide copies of documents indicating the length of rehabilitated and modernised secondary heat network.
CR 1, means of verification
The PP has submitted respective confirmation letter containing information regarding the length and diameters of rehabilitated and modernised secondary heat network and audit team has cross-checked it against note taken during on-site audit.
CR 1, changes in the MR or related documents
NA

CR 2: Provide copies of documents indicating the length of rehabili-tated and modernised

secondary hot potable water network.
CR 2, means of verification
The PP has submitted respective confirmation letter containing information regarding the length and diameters of rehabilitated and modernised secondary heat network and audit team has cross-checked it against note taken during on-site audit.
CR 2, changes in the MR or related documents
NA

CR 3: Clarification Request#3. Clarify the numbers of new consumers for 2011 for both Monitoring periods (from January 2011 to September 2011 and from October 2011 to December 2011). Provide copies of relevant documents.
CR 3, means of verification
The PP included a table clarifying the number of new consumers into MRs and same has been submitted to audit for cross-check. It was checked by audit team against note taken during on-site audit.
CR 3, changes in the MR or related documents
The MRs have been revised accordingly.

CR 4: Provide copies of calibration certificates for metering equipment in following locations: Private House – Druga Dumitru; 38 Gheorghe Titeica St; Private House – Marica Stefan;16 Decebal St.
CR 4, means of verification
The relevant documents were provided by PP. The audit found them correct.
CR 4, changes in the MR or related documents
NA

CR 5: Provide copies of replacement protocols for equipment calibrated 20.02.12.
CR 5, means of verification
The relevant documents were provided by PP. The audit found them correct.
CR 5, changes in the MR or related documents
NA

CR 6: Clarify why the procedures PO-MCRTH 14 issuance and revision dates are the same.
CR 6, means of verification
Correct issuance date (1.7.2009) and revision date (20.5.2010) were indicated for the procedure PO-MCRTH 14.The audit found them correct.
CR 6, changes in the MR or related documents
Procedure PO-MCRTH 14 was up-dated accordingly.

CR 7: Provide copies of monthly reports for district heat supplied to: (i) heat conversion substations (ii) consumers connected to the primary network (iii) secondary network (iv) consumers connected to secondary network (v) new consumers connected to the primary network (vi) new consumers connected to the secondary network issued by the District Heating Department.
CR 7, means of verification
The relevant documents were provided by PP. The audit found them correct.
CR 7, changes in the MR or related documents
NA.

CR 8: Provide copies of replacement protocols and calibration of previuosly installed metering equipment for Block of flats – Corneliu Savoiu 3, block A1 entrance 5.
CR 8, means of verification
The relevant documents were provided by PP. The audit found them correct.
CR 8, changes in the MR or related documents
NA.

CR 9: Clarify why hot water flowmeters at private houses – Gheorghe Anghel 41 and Adrian 159A do not have serial number indicated and is not calibrated.
CR 9, means of verification
The copies of the calibration certificates and the photos of relevant equipment were provided by PP. The audit found them correct.
CR 9, changes in the MR or related documents
NA

CR 10: Clarify why MR numbers are 1 and 4?
CR 10, means of verification
The PP provided MRs numbered as following: for the period 01.01.11 – 30.09.11 MR no: 4.1 and for the period 01.10.11 – 31.12.11 MR no: 4.2. The audit found them correct.
CR 10, changes in the MR or related documents
The MRs have been revised accordingly.

CR 11: Clarify why the process steam production in June 2011 was much lower than the other months?
CR 11, means of verification
The PP provided relevant explanation in the response to CR. The audit found it correct.
CR 11, changes in the MR or related documents
NA

CR 12: In the ER excel file for 3 months in 2011, folder "Annex I", the thermal efficiency of the primary district heating network in October is much lower than in November and December, please clarify.
CR 12, means of verification
The PP provided relevant explanation in the response to CR. The audit found it correct.
CR 12, changes in the MR or related documents
NA

CR 13: The efficiencies of the heat conversion substations and in the secondary network given in both Monitoring Reports are not consistent with the corresponding ER calculation files, folder "Annex I System Efficiencies". Clarify how the values in the MRs have been calculated?
CR 13, means of verification
The PP provided MRs with corrected efficiencies of the heat conversion substations and in the secondary network. The audit found them correct.
CR 13, changes in the MR or related documents
The MRs have been revised accordingly.

CR 14: Provide copies of invoices of delivered biomass for veri-fication of net calorific value of biomass.
CR 14, means of verification
The PP provided relevant certificates for the NCV of biomass. They were checked by audit

team against note taken during on-site audit.
CR 14, changes in the MR or related documents
The MRs have been revised accordingly.

FAR 1: The procedure of distinguishing between old and new consumers is somehow confusing and not documented properly. There should be a documented procedure to distinguish between old consumers and the new ones.
FAR 1, means of verification
This issue will be checked in next periodic verification.
FAR 1, changes in the MR or related documents
NA

Industrie Service

5. VERIFICATION STATEMENT

TÜV SÜD Industrie Service GmbH has performed the fourth periodic verification of the JI track 1 project: "Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin". The verification is based on the currently valid documentation of the UN Framework Convention on Climate Change (UNFCCC) and takes into account in general all requirements for JI projects as well as specific national regulations as described in the Romanian National JI Track I Procedure of the Romanian DFP.
The management of ROMAG TPP is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions on the basis set out within the project's Monitoring Plan indicated in the JI PDD version 08, dated 07-11-2009. The verifier can confirm that:

- the development and maintenance of records and reporting procedures are in accordance with the monitoring plan;
- the project is operated as planned and described in the JI project design document;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements;
- the monitoring plan in Monitoring Report is as per the PDD and monitoring plan approved by the JISC;
- the monitoring plan in the approved PDD is as per the applied project specific methodology.

Our opinion is based on the project's GHG emissions and resulting GHG emission reductions reported, which have been both determined through the valid project's baseline, its monitoring plan and its associated documents.

Based on the information we have seen and evaluated, we confirm the following statement:

Reporting period: From 01-01-2011 to 31-12-2011

Verified emissions in the above reporting period:

	Total from 01-01-2011 to 31-12-2011	Sub-period from 01-01-2011 to 30-09-2011	Sub-period from 01-10-2011 to 31-12-2011
Baseline Emissions:	494 417 t CO_{2e}	298 921 CO_{2e}	195 496 CO_{2e}
Project Emissions:	417 361 CO_{2e}	254 447 CO_{2e}	162 914 CO_{2e}
Total Emission Reductions:	77 056 CO_{2e}	44 474 CO_{2e}	32 582 CO_{2e}

Munich, 18-12-2012

Thomas Kleiser
Head of the Certification Body
"climate and energy"
TÜV SÜD Industrie Service GmbH

Munich, 18-12-2012

TÜV SÜD Industrie Service GmbH Carbon Management Service

Nikunj Agarwal
Assessment Team Leader

Annex 1: Verification Protocol

TÜV SÜD Industrie Service GmbH
Carbon Management Service

Fourth Periodic Verification Protocol

Project Title: Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin

Date of Completion: 18-12-2012

Number of Pages: 79

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Fourth Periodic Verification Protocol

Project Title: Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin
Date of Completion: 18-12-2012
Number of Pages: 79

1. Project Activity Implementation

1.1. Technology

Location (s)			
	PDD Description	Verified Situation	Conclusion and IRL
Description / Address: Calea Tg. Jiului, Km. 5, Drobeta Turnu-Severin, Mehedinti	ROMAG TPP is located approximately 5 km north-east from Drobeta Turnu-Severin in the Mehedinti Region, Romania	The location of the project site is described correct. There is the ROMAG THERM power plant outside the city connected with the project site, heat distribution network in Drobeta Turnu-Severin.	☑
GSP coordinates:	Latitude 44°40 min 25.5 N, Longitude 22°41 min 18 E	Latitude 44°40‘25.5‘‘ N, Longitude 22°41‘ 18‘‘ E The information provided in the PDD and during on-site verification found correct and also further cross-check with Google earth.	☑
Technical Equipment – Main Components			
	PDD Description	Verified Situation	Conclusion and IRL
Description	The CHP plant is equipped with 6 boiler units and 6 turbines. The thermal and electric efficiencies of the power plant amount to approximately 27% and 21%, respectively.	Boiler- and machine-house is one large but compact building. All the boilers and respective machines (turbine and generator) are in line. The operation of all the components could be followed up at the process control panels.	☑ IRL#6
Component 1- 6:	Boiler No.1 – No.6	Capacity:	☑

Technical Features		258 Gcal/h equiv. 300 MW each, steam capacity 420 t/h. Manufacturer: SC VULCAN BUCHAREST SA Romania Commissioning date / Serial number: No.1 31.07.1986 / CR1670 / 22244/82 No.2 30.06.1987 / CR1670 / 22250/82 No.3 27.04.1988 / CRG 1666 / 22721/84 No.4 28.11.1988 / CR 1244 / 23723/86 No.5 31.05.1990 / CR 1870 / 24729/88 No.6 28.02.1991 / CRG 1870 / 24737/89	IRL#6
Component 7: Technical Features	Turbo-generator no. 1, condensing turbine	Capacity: 50 MW Manufacturer: SC GENERAL TURBO SA, Romania Commissioning date: 31.07.1986 Serial number: DSL 50-1 / 3829	☑ IRL#6
Component 8: Technical Features	Turbo-generator no. 4, condensing turbine	Capacity: 50 MW Manufacturer: SC GENERAL TURBO SA, Romania Commissioning date: 31.07.1989 Serial number: DSL 50-1 / 3832	☑ IRL#6
Component 9: Technical Features	Turbo-generator no. 5, condensing turbine	Capacity: 50 MW Manufacturer: SC GENERAL TURBO SA, Romania Commissioning date: 08.04.2004 Serial number: DSL 50-1 / 2660	☑ IRL#6
Component 10: Technical Features	Turbo-generator no. 6, condensing turbine	Capacity: 25 MW Manufacturer: SC GENERAL TURBO SA,	☑ IRL#6

		Romania Commissioning date: 29.12.2004 Serial number: SC 25 / 2682	
Component 11: Technical Features	Turbo-generator no. 2, backpressure turbine	Capacity: 50 MW Manufacturer: SC GENERAL TURBO SA, Romania Commissioning date: 30.06.1987 Serial number: DKUL / 3226 There are two backpressure turbines installed. The description in the PDD was updated in V8.	☑ IRL#6
Component 12: Technical Features	Turbo-generator no. 3, backpressure turbine	Capacity: 22 MW Manufacturer: SC GENERAL TURBO SA, Romania Commissioning date: 02.08.2007 Serial number: DKAR 22 / 22966 Due to the verified situation onsite turbo-generator no. 3 is a backpressure machine.	☑ IRL#6
Component 13: Technical Features	38 Heat conversion substations	Capacity: HEAT : 0 –3 Gcal/h; HOT SANITARY WATER : 0-2 Gcal/h Manufacturer: Reconstruction Commissioning date: 10/2006 - 28.02.2007 Serial number: HCS1; HCS2; HCS3; HCS4; HCS5; HCS6; HCS7; HCS8; HCS9; HCS13; HCS17; HCS19; HCS20; HCS21; HCS22; HCS23; HCS24; HCS25; HCS27; HCS29;	☑ IRL#6

		HCS30; HCS31; HCS32; HCS35; HCS36; HCS38; HCS39; HCS40; HCS41; HCS42; HCS43; HCS53; HCS54; HCS55; HCS59; HCS60; HCS66; HCS67	
Component 14: Technical Features	Secondary heat network rehabilitation and modernisation, total length of 96.307 m.	It is not clear how many of secondary heat network has been rehabilitated or modernised. **Clarification Request#1** *Provide copies of documents indicating the length of rehabilitated and modernised secondary heat network*.	Clarification Request#1 ☑ IRL#6 IRL#28 IRL#31
Component 15: Technical Features	Secondary hot potable water network rehabilitation and modernisation, total length 95.219 m.	It is not clear how many of secondary hot potable water network has been rehabilitated or modernised. **Clarification Request#2** *Provide copies of documents indicating the length of rehabilitated and modernised secondary hot potable water network.*	Clarification Request#2 ☑ IRL#6 IRL#28 IRL#31
Operation Status during verification			
	Verified Situation		Conclusion and IRL
Approvals / Licenses	ROMAG Termo TPP is supplying heat to customers of the primary and secondary heat distribution network of the Drobeta Turnu-Severin over many years. The project was implemented to increase the efficiency of the secondary network in the city area. The distribution network is owned and operated by a branch of ROMAG Termo since January 2004 when it was handed over by the municipality. A contract (operation permit, concession) has been provided that the actual situation of		☑

	ownership and operation will be covering the project lifetime.	
Actual Operation Status	Start date of operation (each site if applicable): 14/02/2006 Under construction ☐ In operation ☒ Out of operation ☐ Reason and date (if out of operation):	☑
	The data basis for an appropriate operation provide the excel spreadsheets of the annual Monitoring Report that allowed the calculation of energy balances and shows several efficiencies. The operation was verified onsite by visiting the power plant and the central control room for the district heating system with an indication of every HCS in operation. Samples of HCS were visited as well to check the installation and metering system.	☑
Remarks to Special Operational Status During the Verification Period	Phased implementation: The project was implemented between October 2006 and March 2008 in three stages. So it was finalized during the second monitoring period. The progress that was achieved is reflected by growing thermal efficiencies of the secondary network. After reconstruction the HCS were integrated in the project documented by Final Acceptance Reports. Then in total 1,485 consumers are connected to the district heating system, 419 consumers to the primary network and 1,066 consumers to the secondary network. **Correction Action Request#1** Information about phased implementation of pipe replacement programme is missing from MR. Provide information. See also Clarification Request#1 and Clarification Request#2. There are a growing number of new connections to consumers in the secondary network from HCS that are a part of the project. Until the end of 2011 there are in total 593 new consumers connected to secondary network, including 36 new connections in 2011. Furthermore in 2011 there have been connected 77 new consumers to primary	Correction Action Request#1 Clarification Request#1 Clarification Request#2 Clarification Request#3 Forward Action Request#1 ☑ IRL#28 IRL#29 IRL#31

	network, in total 361 until the end of 2011. **<u>Clarification Request#3</u>** Clarify the numbers of new consumers for 2011 for both Monitoring periods (from January 2011 to September *2011 and from October 2011 to December 2011). Provide copies of relevant documents.* These connections are monitored separately and considered as not project integrated. Baseline and project emissions caused by connections to new consumers of the primary and secondary network are discounted in the calculation. This is due to the project specific methodology in the registered PDD. **<u>Forward Action Request#1</u>** The procedure of distinguishing between old and new consumers is somehow confusing and not documented properly. There should be a documented procedure to distinguish between old consumers and the new ones.	

1.2. Organization

Project Participant (s)		
	Verified Situation	Conclusion and IRL
Entity / Responsible person: ROMAG TPP / General Director Danish Energy Agency / Deputy Programme Director	The responsibilities have not changed regarding to positions in comparison to the registered PDD.	☑
JI Project management:	The responsibility has not changed due to the person.	☑

ROMAG TTP / Eng. Lelia Dobjanschi		

1.3. Quality Management System

General aspects of the Quality Management System		
	Verified Situation	Conclusion and IRL
Quality Management Manual:	The Monitoring Plan Guidelines and Procedures, Version 4 is the basic document that detailed guides to fulfil the requirements of reporting accordance to the Monitoring Plan. **Correction Action Request#8** *Include dates of last revision of each monitoring procedure in Description of monitoring methods and equipment in both Monitoring Reports.* **Correction Action Request#9** *In both Monitoring Reports chapter 6.2 states that no adjustments of monitoring methods and equipment were not necessary. However it is not consistent with the fact that combustion of biomass is used up from 2010 which was not foreseen in the registered PDD. Correct MR-s!*	Correction Action Request#8 Correction Action Request#9 ☑ IRL#4 IRL#30
Responsibilities:	The Monitoring Plan refers directly to the Monitoring Plan Guidelines and Procedures. A further QM-Procedure "Management and Monitoring System, JI-Project provides all the responsibility in a detailed manner and refers to the JI-Project Organization Chart. It was verified on-site that internal review and cross-check has been done before finalization/signed final report and data on a monthly bases.	☑ IRL#19
Qualification and Training:	Basis of qualification and training of key personal is the "Personal Training Procedure". This is applied to the secondary and high education personnel. The training is organized once per year and includes all requirements regarding the JI-Project.	☑ IRL#13 IRL#14

	Participation records were verified provided.	
Implementation of QM-system	ROMAG TPP is practicing an approved QM-System based on ISO 9001 since 2002. All the project relevant documents and procedures are integrated in the system that is strictly applied.	☑

1.4. Remaining FARs from previous Verifications (or forwarded issues of validation report)

Remaining Requests from Previous Verifications	Summary of project owner response	Audit team Conclusion and IRL
<u>Forward Action Request No. 1</u> Please include a separate sub-chapter in monitoring report (in chapter 7) for operation conditions of equipments (for e.g. shut downs, unexpected events like malfunction and further critical issues).	A separate sub-chapter has been included in the monitoring report.	*A separate chapter 9 was included in MRs 4.1 and 4.2 v4 to chapter 9, information given there is sufficient to describe operation conditions during monitoring period. The issue is closed.* ☑

2. Monitoring Plan Implementation

2.1. Parameters

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
	V P, lignite	$V_{P,lignite}$	2.4 table 1	Compliant with PDD and Monitoring Report	☑
	V P, oil	$V_{P,oil}$	2.4 table 2	Compliant with PDD and Monitoring Report	☑
	n/a	$V_{P,biomass}$	2.5 table 1	Compliant with Monitoring Report. The parameter was added to MP in 2010 as a result of change after verification procedure.	☑
	cv P, lignite	$cv_{P,lignite}$	2.3 table 1	Compliant with PDD and Monitoring Report	☑
	cv P ,oil	$cv_{P,oil}$	2.3 table 2	Compliant with PDD and Monitoring Report	☑
	n/a	$CV_{P,biomass}$	2.5 table 2	Compliant with Monitoring Report. The parameter was added to MP in 2010 as a result of change after verification procedure.	☑
	Q P, DH,primary	$Q_{P,DH,primary}$	2.2 table 1	Compliant with PDD and Monitoring Report	☑
	Q P, ps	$Q_{P,ps}$	2.2 table 2	Compliant with PDD and Monitoring Report	☑
	Q P, DH,HCS	$Q_{P,DH,HCS}$	2.2 table 3	Compliant with PDD and Monitoring Report	☑
	Q P, DH,pr,con	$Q_{P,DH,pr.con}$	2.2 table 4	Compliant with PDD and Monitoring Report	☑

Parameters					
Meth/tool	PDD	MR	Included in table	Compliance	Conclusion and IRL
	Q P, DH, secondary	$Q_{P,DH,secondary}$	*2.2 table 5*	Compliant with PDD and Monitoring Report	☑
	Q P, DH, consumers	$Q_{P,DH,consumers}$	*2.2 table 6*	Compliant with PDD and Monitoring Report	☑
	Q P, DH, *pr.new_con*		*2.2 table 7*	Compliant with PDD and Monitoring Report	☑
	Q P, DH, *sec,new_con*		*2.2 table 8*	Compliant with PDD and Monitoring Report	☑
				Clarification Request#4 *Provide copies of calibration certificates for metering equipment in following locations:* *Private House – Druga Dumitru; 38 Gheorghe Titeica St;* *Private House – Marica Stefan;16 Decebal St.*	Clarification Request#4 ☑ IRL#32

2.2. Parameters measured directly with instruments

Table 1

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	District heat supplied to the primary network	n. a.	district heat delivered to primary network	Description of title is consistent.	☑
Parameter ID (if available)	Q P, DH,primary	n. a	$Q_{P,DH,primary}$	Parameter ID is consis-	☑

				tent	
Data Unit	Gcal	n. a	Gcal	Used unit is consistent.	☑
Monitoring frequency (reading)	every 8 hours, daily log	n. a	every 8 hours, daily log	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a	monthly	This is consistent.	☑
Calibration requirements	every 4 years	n. a	every 4 years	1. Heat computer BV 0111461/20.02.2012 BV 0084760/23.01.08 BV 0085679/09.09.04 2. Twin Thermo-resistances BV 0111461/20.02.2012 BV 0084761/23.01.08 BV 0083121/19.07.06 3. Ultrasonic Flow Meter (FP) BM 03/20.02.2012 BV 06.02 – 001/20.02.08 BV 06.02 – 007/27.09.04 4. Ultrasonic Flow Meter (RP) BM 04/20.02.12 BV 06.02 – 002/20.02.08	Clarification Request#5 ☑ IRL#7 IRL#33

				BV 06.02 – 008/27.09.04 **<u>Clarification Request#5</u>** *Provide copies of re-placement protocols for equipment calibrated 20.02.12.*	
Uncertainty level	low	n. a	0.2 %	The value of the calibrat-ed system is consistent to a “low” uncertainty level that was stated in the PDD.	☑
Measurement Principle (if applica-ble)	Ultrasonic flow meter, heat cal-culator	n. a	Ultrasonic flow meter, heat calculator	This is consistent	☑
	Technical aspects				Conclusion and IRL
Instrument Type:	Heat Meter SONOFLO/CALEC consisting of: 1. Heat Computer CALEC-MB TWIN E 2. Twin Thermo Resistances Pt 100 TPK 3. Ultrasonic Flow Meter (Forward pipe) – SONO 3110/3000 4. Ultrasonic Flow Meter (Return pipe) – SONO 3110/3000				☑
Serial Number:	1. 4113149/00 2. 185055-00 3. 335908N310 4. 131204N417				☑
Manufacturer Model Nr.:	1. Heat Computer CALEC-MB TWIN E 2. Twin Thermo Resistances Pt 100 TPK 3. Ultrasonic Flow Meter (Forward pipe) – SONO 3110/3000				☑

	4. Ultrasonic Flow Meter (Return pipe) – SONO 3110/3000	
Specific Location:	Romag Thermo TPP, At the fence of CHP	☑
Measurement Range:	0 – 4000m3/h (0 – 160 Gcal/h)	☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for this instrument during monitoring period. However see Clarification Request#5.	☑
	Default value used: In case of gaps according to Project Procedure PO-RT84	☑
	Justification: according to Project Procedure PO-RT94	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Readouts of instrumentation collected manually every 8 hours in and logged in daily reports. Type: measured manually, logbook, daily report.	☑ IRL#34
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 and QM PO-RT94 Management and Monitoring, training on the job **Clarification Request#6** *Clarify why the procedures PO-MCRTH 14 issuance and revision dates are the same.*	Clarification Request#6 ☑ IRL#19
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: Control Room Operating Staff - Turbine Department (PO-RT82)	☑
Archiving of raw data and protec-	Raw data is archived until the end of 2014.	☑

tion measures	According to Project Procedure PO – RT – 94 project data are archived on paper and CDs in two different locations. Recordings in logbooks are archived in paper form, the values of the daily reports are put into an excel spreadsheet prepared for one month. The project relevant data of one month are summarized in a JI Process Data Log Sheet.	
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, from where they are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology. Cells containing project formulae are locked. Raw data related to Process Steam and Hot Water Production delivered to industrial consumers and district heating systems are daily transferred electronically and as hardcopy to the Technical Department. Therefore the Turbine Department is responsible. The Technical Department is processing the data and validating it by calculation of heat balances. The Technical Department transfers the data to the JI-Department that is controlling, recording and archiving the data and performing the calculation. Data losses can be avoided because all data are daily stored electronically and per hardcopy. Row data can be followed down to logbook recordings.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. The data flow was followed up from logs to monthly reports for the full monitoring period.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports and related samples of daily records issued by the Heat Production Department. Some discrepancies have been identified. **<u>Correction Action Request#2</u>** *Data for District heat supplied to primary network in monthly*	Correction Action Request#2 ☑ IRL#4 IRL#26

	reports issued by the JI-Department are not consistent to the calculation tool. Correct inconsistency.	IRL#27 IRL#29
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	The parameter that can be used for plausibility crosscheck is the calculated system efficiency of primary network in the Monitoring Excel Spreadsheet Tool. The efficiency is related to total amount of heat delivered to the primary network.	☑

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Table 2

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	Process steam produced for heavy water producers	n. a.	Process steam production	As it describes the process steam production that is only delivered to heavy water producers it is consistent.	☑
Parameter ID (if available)	Q P, ps	n. a.	$Q_{P, ps}$	Parameter ID is consistent	☑
Data Unit	Gcal	n. a.	Gcal	Used unit is consistent	☑
Monitoring frequency (reading)	Every hour (manu-	n. a.	Every hour (manu-	This is consistent.	☑

	ally and automatically) logged for the day		ally) logged for the day		
Monitoring frequency (recording)	monthly	n. a.	monthly	This is consistent.	☑
Calibration requirements	every 2 years	n. a.	every 2 years There are no official requirements according to present legislation (ordinance 48 by Romanian Legal Metrological Laboratory) but PP has decided to calibrate every 2 years on a voluntary bases.	Recent calibration campaign in, details for every part of the metering equipment are provided and can be assessed with documents. Diaphragms are calibrated together with other equipment.	☑ IRL#7
Uncertainty level	low	n. a.	0,1 %	The value of the calibrated system is consistent to a “low” uncertainty level that was stated in the PDD.	☑
Measurement Principle (if applicable)	n. a.	n. a.	Differential pressure Diaphragm, heat calculator	Evidence was supplied by calibration certificates.	☑
	Technical aspects				Conclusion and IRL
Instrument Type: **Instrument 1 - 3**	**Feeders 16 bar**: 1. Computer MULTICAL CCA1212 2. Thermo Resistances Pt 100 3. Diaphragm DN = 558.88				☑

	4. Differential Pressure Transducer 5. Relative Pressure Transducer 3 meters for each line A, B, C: Computer "Multical"CCA 1212+thermoresistance Pt100+diaphragm+differential pressure sensor+relative pressure sensor	
Serial Number:	**Feeder 1** – **16 bar**: 1. Computer – 0242 2. Thermo Resistances – 1168 3. Diaphragm – 2049/2009 4. Differential Pressure Transducer – 3040/01 5. Relative Pressure Transducer – 401/00 **Feeder 2** – **16 bar**: 1. Computer – 0243 2. Thermo Resistances – 70 3. Diaphragm – 2050/2009 4. Differential Pressure Transducer – 3037 5. Relative Pressure Transducer – 403/00 **Feeder 3** – **16 bar**: 1. Computer – 0244 2. Thermo Resistances – 398 3. Diaphragm – 2051/2009 4. Differential Pressure Transducer – 3035/01 5. Relative Pressure Transducer – 5024/01	☑
Manufacturer Model Nr.:	**Feeders 16 bar**: 1. Computer MULTICAL CCA1212 2. Thermo Resistances Pt 100 3. Diaphragm DN20 = 558.88 4. Differential Pressure Transducer	☑

	5. Relative Pressure Transducer	
Specific Location:	At the border between Romag Termo TPP and Romag Prod (Heavy Water Producer) TPP , each main pipe 16 bar	☑
Measurement Range:	**Feeders 16 bar**: 1 – 16 bar / 0 – 400 t/h	☑
Gaps in operating time of instrument :	Period: There are no gaps in operating time for these instruments. In case of repair or calibration alternate pipe is used.	☑
	Default value used: n. a.	☑
	Justification: n. a.	☑
Instrument Type: **Instrument 4 - 6**	**Feeders 40 bar**: 1. Computer MULTICAL CCA1212 2. Thermo Resistances Pt 100 3. Diaphragm DN20 = 226.31 4. Differential Pressure Transducer 5. Relative Pressure Transducer 3 meters for each line A, B, C: Computer “Multical”CCA 1212+thermoresistance Pt100+diaphragm+differential pressure sensor+relative pressure sensor	☑
Serial Number:	**Feeder 1 – 40 bar**: 1. Computer – 0239 2. Thermo Resistances – 1359/86 3. Diaphragm – OB.740-1 4. Differential Pressure Transducer – 3037/01 5. Relative Pressure Transducer – 9001/01 **Feeder 2 – 40 bar**: 1. Computer – 0240 2. Thermo Resistances – 1241	☑

	3. Diaphragm – OB.740-2 4. Differential Pressure Transducer – 3023/01 5. Relative Pressure Transducer – 9002/01 **Feeder 3 – 40 bar**: 1. Computer – 0241 2. Thermo Resistances – 875 3. Diaphragm – OB.740-3 4. Differential Pressure Transducer – 3036/01 5. Relative Pressure Transducer – 3011/01	
Manufacturer Model Nr.:	**Feeders 40 bar:** 1. Computer MULTICAL CCA1212 2. Thermo Resistances Pt 100 3. Diaphragm DN20 = 226.31 4. Differential Pressure Transducer 5. Relative Pressure Transducer	☑
Specific Location:	At the border between Romag Termo TPP and Romag Prod (Heavy Water Producer) Each main pipe 40 bar	☑
Measurement Range:	1 – 40 bar / 0 – 120 t/h	☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for these instruments. In case of repair or calibration alternate pipe is used.	☑
	Default value used: In case of gaps according to Project Procedure PO-RT94	☑
	Justification: According to Project Procedure PO-RT94	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Readouts of instrumentation collected manually every 8 hours in and logged in daily reports. Type: measured manually, logbook, daily report.	☑

	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 and QM PO-RT94 Management and Monitoring, training on the job. However see Clarification Request#6.	Clarification Request#6 ☑ IRL#33
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: Control Room Operating Staff - Turbine Department (PO-RT82)	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are archived on paper and CDs in two different locations until the end of 2014. The records are in paper and in electronic form. Data are archived in data files and stored in different places. (Technical department, JI-Department).	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, from where they are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology. Cells containing project formulae are locked. Raw data related to Process Steam and Hot Water Production delivered to industrial consumers and district heating system are daily transferred electronically and as hardcopy to the Technical Department. Therefore the Turbine Department is responsible. The Technical Department is processing the data and validating it by calculation of heat balances. The Technical Department transfers the data to the JI-Department that is controlling, recording and archiving the data and performing the calculation. Data losses can be avoided because all data are daily stored electronically and per hardcopy. Row data can be followed down to logbook recordings.	☑
	Quality of evidence	Conclusion and IRL

Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. The data flow was followed up from logs to monthly reports for the full monitoring period.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Heat Production Department. No discrepancies have been found and all data are consistent to the calculation tool. **Correction Action Request#3** *Data for Process steam production in monthly reports issued by the JI-Department are not consistent to the calculation tool. Correct inconsistency.* **Clarification Request#11** *Clarify why the process steam production in June 2011 was much lower than the other months?*	Correction Action Request#3 Clarification Request#11 ☑ IRL#29
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	Calculation can be crosschecked by monthly or annual heat balances between fuel consumption and total heat production considering the thermal efficiency of the boilers. **Correction Action Request#4** *Units in the excel sheet "Heat and Steam_Monthly Calculation Methodology_2011.xls" are missing. Include units.*	Correction Action Request#4 ☑ IRL#29

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Table 3

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	District heat supplied to heat conversion substations	n. a. (project specific approach presented in the approved and registered PDD)	District heat supplied to heat conversion substations	Description of title is consistent.	☑
Parameter ID (if available)	$Q_{P,DH,HCS}$	n. a.	$Q_{P,DH,HCS}$	Parameter ID is consistent	☑
Data Unit	Gcal	n. a.	Gcal	Unit is consistent.	☑
Monitoring frequency (reading)	Every hour (manually and automatically) logged for the day	n. a.	Every hour (manually) logged for the day	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a.	monthly	This is consistent.	☑
Calibration requirements	Every 4 years	n. a.	Every 4 years	Based on the following Verification Permits (BV): **11 Heat Computer** BV 6279/16.03.09 **2. Twin Thermo Resistances** BV 3194/16.03.09 **3. Ultrasonic Flow Transducer** BV 205/25.03.09	☑ IRL#7

Uncertainty level	low	n. a.	2 %	The value of the calibrated system is consistent to a "low" uncertainty level that was stated in the PDD. The valid calibration permits cover the whole monitoring period.	☑
Measurement Principle (if applicable)	Heat meter	n. a.	Ultrasonic	This is consistent. More specification is provided within followed.	☑
	Technical aspects				Conclusion and IRL
Instrument Type:	Heat Meter KAMSTRUP A/S consisting of: 1. Heat Computer MULTICAL 2. Twin Thermo Resistances 3. Ultrasonic Flow Transducer ULTRAFLOW				☑
Serial Number:	1. Heat Computer - 4966585 2. Twin Thermo Resistances - 3589417 3. Ultrasonic Flow Transducer – 4966585				☑
Manufacturer Model Nr.:	1. Heat Computer MULTICAL 2. Twin Thermo Resistances 3. Ultrasonic Flow Transducer ULTRAFLOW				☑
Specific Location:	HCS 21, Aleea Lacrimioarelor nr.10				☑
Measurement Range:	0 – 5 Gcal/h				☑
Gaps in operating time of instrument :	Period: There were some gaps in operating time for these instruments. The events are documented in default logs which were reviewed on-site. However there are no gaps in data as instruments have maintained the information in the memory.				☑ IRL#16
	Default value used: In case of gaps according to Project Procedure PO-RT84. Heat delivered to consumers related to the HCS the instrument fails can be used.				☑

	Justification: According to Project Procedure PO-RT94.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Data are collected manually and logged for the month. Type: Manual	☑
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 Management and Monitoring, PO-RT94 Determination of the Power Plant Heat and Steam delivered to consumers, training on the job. See also Clarification Request#6.	Clarification Request#6 ☑
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: District Heating Department Staff	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations. Manual reading protocols are archived in District Heating Department until the end of 2014.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 94, project data are transferred from District Heating Department to JI Project Department manually. Input of data and calculation is performed by JI Department of ROMAG THERMO.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provid-ed. These reports were checked with monthly reports issued by the District Heating Depart-	Clarification Request#7

	ment. No discrepancies have been found and all data are consistent to the calculation tool. **<u>Clarification Request#7</u>** *Provide copies of monthly reports for district heat supplied to:* *(i) heat conversion substations* *(ii) consumers connected to the primary network* *(iii) secondary network* *(iv) consumers connected to secondary network* *(v) new consumers connected to the primary network* *(vi) new consumers connected to the secondary network* *issued by the District Heating Department.*	☑ IRL#34
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	Calculation can be crosschecked with the heat supplied to consumers considering the efficiency of HCS.	☑

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Table 4

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	District heat supplied to consumers connected to the primary network	n. a.	District heat supplied to consumers connected to the primary network	Description of the title is consistent.	☑
Parameter ID (if available)	$Q_{P,DH,pr.con}$	n. a.	$Q_{P,DH,pr.con}$	Parameter ID is consistent	☑

Data Unit	Gcal	n. a.	Gcal	Unit is consistent.	☑
Monitoring frequency (reading)	Manually, monthly	n. a.	Manually , monthly	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a.	monthly	This is consistent.	☑
Calibration requirements	Every 4 years	n. a.	Every 4 years	**1. Heat Computer** BV 82/ 12.05.08 **2. Twin Thermo-Resistances** BV 160/02.06.08, **3. Flow Transducer** BV 225/ 02.07.08. Before the project imple-mentation there was no measuring equipment installed. The billing of heat was made based on heated area.	☑
Uncertainty level	low	n. a.	2 %	The value of the calibrated system is consistent to a "low" uncertainty level that was stated in the PDD. The valid calibration permits cover the whole monitoring period.	☑
Measurement Principle (if applica-ble)	Heat meter	n. a.	Ultrasonic	This is consistent. More specification is provided within followed.	☑
	Technical aspects				Conclusion and IRL

Instrument Type:	Heat Meter Somtex 431 consisting of: 1. Heat Computer 2. Twin Thermo-Resistances 3. Flow Transducer	☑
Serial Number:	1. Heat Computer – 03380642 2. Twin Thermo-Resistances – 04340003 3. Flow Transducer 0242521	☑
Manufacturer Model Nr.:	Somtex 431	☑
Specific Location:	Private House – Casa Dobjanschi, Drobeta Turnu Severin.	☑
Measurement Range:	0 – 1 Gcal/h	☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for these instruments.	☑
	Default value used: None default values have been used.	☑
	Justification: According to Project Procedure PO-RT84.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Data are collected manually monthly. Type: digital	☑
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 Management and Monitoring, PO-RT94 Determination of the Power Plant Heat and Steam delivered to consumers, training on the job	☑
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: District Heating Department Staff	☑

Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations. Manual reading protocols are archived in District Heating Department until the end of 2014.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 94, project data are transferred from District Heating Department to JI Project Department manually. Input of data and calculation is performed by JI Department of ROMAG THERMO.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool.	Clarification Request#7 ☑ IRL#34
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	Calculation can be crosschecked with the general heat balance of power plant and supplied networks.	☑

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Table 5

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	District heat supplied to secondary	n. a.	District heat supplied to secondary	Description of the title is consistent.	☑

	network		network		
Parameter ID (if available)	$Q_{P,DH,\text{secondary}}$	n. a.	$Q_{P,DH,\text{secondary}}$	Parameter ID is consistent	☑
Data Unit	Gcal	n. a.	Gcal	Unit is consistent.	☑
Monitoring frequency (reading)	Every our (manually and automatically) logged for the day	n. a.	Every hour (manually and automatically) logged for the day	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a.	monthly	This is consistent.	☑
Calibration requirements	Every 4 years	n. a.	Every 4 years	**HEAT System**- latest 2 calibrations: 23.04.09. **HOT SANITARY WATER System** latest 2 calibrations: 10.09.08	☑
Uncertainty level	low	n. a.	2 %	The value of the calibrated system is consistent to a “low” uncertainty level that was stated in the PDD. The valid calibration permits cover the whole monitoring period.	☑
Measurement Principle (if applicable)	Heat meter	n. a.	Ultrasonic	This is consistent. More specification is provided within followed.	☑

Fourth Periodic Verification Protocol

Project Title: Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin

Date of Completion: 18-12-2012

Number of Pages: 79

	Technical aspects	Conclusion and IRL
Instrument Type:	Heat Meters KAMSTRUP A/S consisting of: 1. Heat Computer MULTICAL 2. Twin Thermo-Resistances 3. Ultrasonic Flow Transducer ULTRAFLOW	☑
Serial Number:	**HEAT** 1. Heat Computer – 4966683 2. Twin Thermo-Resistances - 3589386 3. Ultrasonic Flow Transducer – 3589295 **HOT SANITARY WATER** 1. Heat Computer – 4966580 2. Twin Thermo-Resistances - 3589439 3. Ultrasonic Flow Transducer – 4966580	☑
Manufacturer Model Nr.:	1. Heat Computer MULTICAL , 2. Twin Thermo-Resistances , 3. Ultrasonic Flow Transducer ULTRAFLOW	☑
Specific Location:	HCS 21, Aleea Lacrimioarelor nr.10	☑
Measurement Range:	**HEAT** : 0 –3 Gcal/h; **HOT SANITARY WATER :** 0-2 Gcal/h	☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for these instruments.	☑
	Default value used: In case of gaps according to Project Procedure PO-RT84. Heat delivered to consumers related to the HCS the instrument fails can be used.	☑
	Justification: According to Project Procedure PO-RT94.	☑
	QA/QC aspects	Conclusion and IRL

Source of data	Data are collected manually and logged for the month. Type: Digital	☑
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 Management and Monitoring, PO-RT94 Determination of the Power Plant Heat and Steam delivered to consumers, training on the job	☑
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: District Heating Department Staff	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 94, project data are transferred from District Heating Department to JI Project Department manually. Input of data and calculation is performed by JI Department.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the JI-Department. No discrepancies have been found and all data are consistent to the calculation tool.	Clarification Request#7 ☑ IRL#34
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑

Crosscheck (if available)	Calculation can be crosschecked with the heat supplied to single consumers connected to the HCS.	☑

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Table 6

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	District heat supplied to consumers connected to the secondary network	n. a.	District heat delivered to consumers connected to secondary network	As it describes the heat to consumers connected to the secondary network it is consistent	☑
Parameter ID (if available)	$Q_{P,DH,consumers}$	n. a.	$Q_{P,DH,consumers}$	Parameter ID is consistent	☑
Data Unit	Gcal	n. a.	Gcal	Unit is consistent.	☑
Monitoring frequency (reading)	Manually, monthly	n. a.	Manually, monthly	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a.	monthly	Monthly	☑
Calibration requirements	Every 4 years	n. a.	Every 4 years	Evidence of the latest 2 calibrations: **HEAT** **1. Heat Computer** BV 7381/13.04.10	Clarification Request#8 ☑ IRL#35

				2. Twin Thermo-Resistances BV 4084/14.04.10 **3. Flow Transducer** BV 861/14.04.10 **HOT SANITARY WATER** **1. Heat Computer** Latest calibration 30.04.11, **2. Twin Thermo-Resistances** Latest calibration 30.04.11 **3. Flow Transducer** Latest calibration 30.04.11 **<u>Clarification Request#8</u>** *Provide copies of replacement protocols and calibration of previuosly installed metering equipment for Block of flats – Corneliu Savoiu 3, block A1 entrance 5.*	
Uncertainty level	low	n. a.	2 %	The value of the calibrated system is consistent to a “low” uncertainty level that was stated in the PDD. The valid calibration permits cover the whole monitoring period.	☑

Measurement Principle (if applicable)	Heat meter	n. a.	Ultrasonic	This is consistent. More specification is provided within followed.	☑
	Technical aspects				Conclusion and IRL
Instrument Type:	Heat Meter US ECHO/Botosani – Romania consisting of: 1. Heat Computer – ELTRAM CF 55 2. Twin Thermo-Resistances 3. Flow Transducer – USECHO II ELSAFLO.				☑
Serial Number:	**HEAT** 1. Heat Computer – 05024255 2. Twin Thermo-Resistances – 05503 3. Flow Transducer – 05532257 **HOT SANITARY WATER** 1. Heat Computer – 06002231; 2. Twin Thermo-Resistances – 04147; 3. Flow Transducer – 05530676.				☑
Manufacturer Model Nr.:	1. Heat Computer – ELTRAM CF 55 2. Twin Thermo-Resistances 3. Flow Transducer – USECHO II ELSAFLO				☑
Specific Location:	Block of flats – Corneliu Savoiu 3, block A1 entrance 5, Drobeta Turnu Severin				☑
Measurement Range:	**HEAT**: 0-1Gcal/h, **HOT SANITARY WATER:** 0-0,5 Gcal/h				☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for these instruments. However see Clarification Request#8.				☑

	Default value used: In case of gaps according to Project Procedure PO-RT84. Heat supplied to secondary network related to the HCS the consumer is connected can be used.	☑
	Justification: According to Project Procedure PO-RT94.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Data are collected manually monthly. Type: digital	☑
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 Management and Monitoring, PO-RT94 Determination of the Power Plant Heat and Steam delivered to consumers, training on the job	☑
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: District Heating Department Staff	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 94, project data are transferred from District Heating Department to JI Project Department manually. Input of data and calculation is performed by JI Department.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑

Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool.	Clarification Request#7 ☑ IRL#34
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	
Crosscheck (if available)	Calculation can be crosschecked with the heat supplied to secondary network considering the efficiency of the secondary network.	☑

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Table 7

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	District heat supplied to new consumers connected to the primary network	n. a.	District heat delivered to new consumers connected to the primary network	As it describes the heat to new consumers connected to the primary network it is consistent. The order of parameter descriptions in the MR follows PDD and Monitoring Manual	☑
Parameter ID (if available)	$Q_{P,DH,pr.new\_con}$	n. a.	$Q_{P,DH,pr.new\_con}$	Parameter ID is consistent	☑

Data Unit	Gcal	n. a.	Gcal	Unit is consistent.	☑
Monitoring frequency (reading)	Manually, monthly	n. a.	Manually, monthly	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a.	monthly	This is consistent.	☑
Calibration requirements	Every 4 years	n. a.	Every 4 years	Evidence of the latest calibration: **1. Heat Computer** BV 0047102/31.10.08 **2. Twin Thermo-Resistances** BV 000112638/04.09.09 **3. Flow Transducer** not indicated	Clarification Request#9 ☑
Uncertainty level	low	n. a.	2 %	The value of the calibrated system is consistent to a "low" uncertainty level that was stated in the PDD.	☑
Measurement Principle (if applicable)	Heat meter	n. a.	Ultrasonic	This is consistent. More specification is provided within followed.	☑
	Technical aspects				Conclusion and IRL
Instrument Type:	Heat Meter ACTARIS – Romania consisting of: 1. Heat Computer – ELSONIC COMPACT 2. Twin Thermo-Resistances 3. Flow Transducer – ELSONIC COMPACT				☑
Serial Number:	1. Heat Computer – 8258837; 2. Twin Thermo-Resistances – 8258837; 3. Flow Transducer – not indicated				☑ Clarification Request#9

	Clarification Request#9 *Clarify why hot water flowmeters at private houses – Gheorghe Anghel 41 and Adrian 159A do not have serial number indicated and is not calibrated.*	IRL#36 IRL#39
Manufacturer Model Nr.:	1. Heat Computer – ELSONIC COMPACT 2. Twin Thermo-Resistances 3. Flow Transducer – ELSONIC COMPACT	☑
Specific Location:	Private House – Gheorghe Anghel 41, Drobeta Turnu Severin	☑
Measurement Range:	0-1Gcal/h	☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for these instruments.	☑ Clarification Request#9 IRL#36 IRL#39
	Default value used: In case of gaps according to Project Procedure PO-RT94.	☑
	Justification: According to Project Procedure PO-RT94.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Data are collected manually monthly. Type: digital	☑
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 Management and Monitoring, PO-RT94 Determination of the Power Plant Heat and Steam delivered to consumers, training on the job	☑
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑

	Responsibility: District Heating Department Staff	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 94, project data are transferred from District Heating Department to JI Project Department manually. Input of data and calculation is performed by JI Department.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool.	Clarification Request#7 ☑ IRL#34
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	Calculation can be crosschecked with the balance of total heat supplied to primary network considering the efficiency of primary network.	☑

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Table 8

Parameter and instrumentation Information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL

Parameter title	District heat supplied to new consumers connected to the secondary network	n. a.	District heat delivered to new consumers connected to the secondary network	As it describes the heat to new consumers connected to the secondary network it is consistent.	☑
Parameter ID (if available)	$Q_{P,DH,\text{sec.}new\_con}$	n. a.	$Q_{P,DH,\text{sec.}new\_con}$	Parameter ID is consistent	☑
Data Unit	Gcal	n. a.	Gcal	Unit is consistent.	☑
Monitoring frequency (reading)	Manually, monthly	n. a.	Manually, monthly When the SCADA-System will be fully operational data are monitored every hour (manually and automatically) logged for the day	This is consistent.	☑
Monitoring frequency (recording)	monthly	n. a.	monthly	This is consistent	☑
Calibration requirements	Every 4 years	n. a.	Every 4 years	**HEAT** BV ELS 000127090/20.09.10 **HOT SANITARY WATER** BV ELS 000116639/06.11.09	Clarification Request#9 ☑ IRL#36

Uncertainty level	low	n. a.	2 %	The value of the calibrated system is consistent to a "low" uncertainty level that was stated in the PDD.	☑
Measurement Principle (if applicable)	Heat meter	n. a.	Ultrasonic	This is consistent. More specification is provided within followed.	☑
	Technical aspects				Conclusion and IRL
Instrument Type:	Heat Meter ACTARIS – Romania consisting of: 1. Heat Computer – ELSONIC COMPACT 2. Twin Thermo-Resistances 3. Flow Transducer – ELSONIC COMPACT				☑
Serial Number:	**HEAT** 1. Heat Computer – 08786021 2. Twin Thermo-Resistances – 0711261 3. Flow Transducer – not indicated **HOT SANITARY WATER:** 1. Heat Computer – 08798014 2. Twin Thermo-Resistances – 0710885 3. Flow Transducer – not indicated **Clarification Request#9** *Clarify why hot water flowmeters at private houses – Gheorghe Anghel 41 and Adrian 159A do not have serial number indicated and is not calibrated.*				Clarification Request#9 ☑ IRL#36 IRL#39
Manufacturer Model Nr.:	1. Heat Computer – ELSONIC COMPACT 2. Twin Thermo-Resistances – 3. Flow Transducer – ELSONIC COMPACT				☑
Specific Location:	Private House – Adrian 159A, Drobeta Turnu Severin (PT10)				☑

Measurement Range:	0-1 Gcal/h	☑
Gaps in operating time of instrument :	Period: There were no gaps in operating time for these instruments.	☑
	Default value used: In case of gaps according to Project Procedure PO-RT94.	☑
	Justification: According to Project Procedure PO-RT94.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Data are collected manually monthly. Type: digital	☑
	Procedures: Internal Working Procedure PO-MCRTH 14 QM PO-RT82 Management and Monitoring, PO-RT94 Determination of the Power Plant Heat and Steam delivered to consumers, training on the job	☑
	Implementation of procedure: The correctness of the procedure implementation has been assessed by onsite visit at the installation site and following the data flow.	☑
	Responsibility: District Heating Department Staff	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 94, project data are transferred from District Heating Department to JI Project Department manually. Input of data and calculation is performed by JI Department.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure.	☑

	Approved monthly reports for the full monitoring period have been supplied.	
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the District Heating Department. No discrepancies have been found and all data are consistent to the calculation tool.	Clarification Request#7 ☑ IRL#34
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Report1 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	Calculation can be crosschecked with the balance of total heat supplied to secondary network considering the efficiency of secondary network.	☑

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2.3. Parameters measured through sampling

Table 1

Sampling information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	Net calorific value of lignite	n. a.	Lower calorific value (MR) / Net calorific value of lignite (Calculation tool)	Description of title is consistent.	☑
Parameter ID (if available)	$cv_{P,lignite}$	n. a.	$cv_{P,lignite}$	Parameter ID is consis-tent	☑
Data Unit	kcal/kg	n. a.	kcal/kg	Unit is consistent.	☑

Sampling frequency	Based on onsite analysis and billing records	n. a.	Before delivery, for each lot of lignite	This is consistent.	☑
Sampling point	Onsite analysis manufacturer	n. a.	Onsite analysis manufacturer	This is consistent.	☑
Uncertainty level	low	n. a.	± 50 Kcal/Kg	The value of the certified analysis system is consistent to a "low" uncertainty level that was stated in the PDD.	☑
	Technical aspects				Conclusion and IRL
Sampling Principle:	Systematic Samples				☑
Methodology of Sampling:	ISO 1988				☑
Sample Analysed by:	Supplier / laboratory of ROMAG TPP coal department				☑ IRL#20
Certification of Analyser/ Laboratory:	The calibration of the equipment was checked onsite the ROMAG TPP laboratory by certificates.				☑
Methodology of Sample Analysis (if applicable)	SR ISO 1928/1995				☑
Measurement Range:	800 – 3000 Kcal/Kg				☑
Gaps in sampling frequency	Period: n. a.				☑
	Default value used: n. a.				☑
	Justification: n. a.				☑

	QA/QC aspects	Conclusion and IRL
Source of data	Type: Certificates (Record Book)	☑
	Procedures: PO – RT – 78 Fuels Calorific Values Determination	☑
	Implementation of procedure: The responsible JI-Project management and the staff of the ROMAG TPP laboratory was interviewed during audit how sampling and analysing processes are conducted. The calibration of the equipment was checked onsite the ROMAG TPP laboratory by certificates.	☑
	Responsibility: Head of Calorimetric Laboratory - analysis Deartemnt of reception of lignite - sampling	☑
	Representativeness: Lignite samplings are split in three portions, and separate analysis are carried out at the level of Supplier and Consumer, while the third portion is kept as witness sample. In case of differences are higher than 50 kcal/Kg, the witness sample will be analyzed and its value will be considered as final value.	☑
	Reproducibility: Lignite samplings are split in three portions, and separate analysis are carried out at the level of Supplier and Consumer, while the third portion is kept as witness sample.	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology. Cells containing project formulae are locked	☑
	Quality of evidence	Conclusion and IRL

Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department. No discrepancies have been found and all data are consistent to the calculation tool.	☑
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	A second analyse from each delivery is made by ROMAG TPP laboratory. In case of a deviation a backup witness sample will be analysed by both. The amount of consumed lignite is one component to calculate the fuel heat applied by the boiler. The general energy balance of the power plant that is done anyway gives the possibility of crosscheck in combination with the amount of fired lignite.	☑

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Table 2

Sampling information					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	Net calorific value of oil	n. a.	Fuel oil lower calorific value (MR) / Net calorific value of fuel oil (Calculation tool)	Description of title is consistent.	☑
Parameter ID (if available)	$cv_{P,oil}$	n. a.	$cv_{P,oil}$	Parameter ID is consis-	☑

				tent	
Data Unit	kcal/kg	n. a.	kcal/kg	Unit is consistent.	☑
Sampling frequency	Based on onsite analysis and billing records	n. a.	For each lot of fuel oil.	This is consistent.	☑ IRL#20
Sampling point	Onsite analysis manufacturer	n. a.	Fuel oil supplier and Consumer (before unload-ing)	This is consistent when onsite means at TPP site before unloading.	☑
Uncertainty level	low	n. a.	± 50 Kcal/Kg	The value of the certified analysis system is con-sistent to a “low” uncer-tainty level that was stated in the PDD.	☑
	Technical aspects				Conclusion and IRL
Sampling Principle:	Random sampling				☑
Methodology of Sampling:	SR ISO 1928/1995				☑
Sample Analysed by:	Supplier / laboratory of ROMAG TPP coal department				☑
Certification of Analyser/ Laboratory:	The calibration of the equipment was checked onsite the ROMAG TPP laboratory by certifi-cates.				☑
Methodology of Sample Analysis	SR ISO 1928/1995				☑
Measurement Range:	8000 – 10000 Kcal/Kg				☑
Gaps in sampling frequency	Period: n. a.				☑
	Default value used: n. a.				☑

	Justification: n. a.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Type: Certificates (Record Book)	☑ IRL#20
	Procedures: PO – RT – 78 Fuels Calorific Values Determination	☑
	The responsible JI-Project management and the staff of the ROMAG TPP laboratory was interviewed during audit how sampling and analysing processes are conducted. The accreditation of the laboratory and the calibration of the equipment were checked.	☑
	Responsibility: Head of Calorimetric Laboratory	☑
	Representativeness: The sampling is done for every delivery of fuel oil before unloading into the tank storage.	☑
	Reproducibility: There are two samples that are analyzed taken at the same time by the supplier and TPP.	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations.	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology. Cells containing project formulae are locked.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑

Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. These reports were checked with monthly reports issued by the Technical Department. No discrepancies have been found and all data are consistent to the calculation tool.	☑
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	Net calorific value of fuel oil is a part of the transport document of the supplier. A second analyse from each delivery is made by ROMAG TPP laboratory. In case of a deviation a backup witness sample will be analysed by both.	☑

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2.4. Parameters obtained through external sources and accounting data

Table 1

External sources and accounting information *use a separate table for each single parameter*					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	Quantity of lignite consumed	n. a.	Total power plant lignite consumption (MR) / Quantity of lignite consumed (Calculation tool)	Description of title is consistent.	☑
Parameter ID (if available)	$V_{P,lignite}$	n. a.	$V_{P,lignite}$	Parameter ID is consistent	☑
Data Unit	T	n. a.	T	Unit is consistent	☑

Fourth Periodic Verification Protocol

Project Title: Energy efficiency improvement of the district heating system in Drobeta Turnu-Severin

Date of Completion: 18-12-2012

Number of Pages: 79

	Technical aspects	Conclusion and IRL
Description of Data / Data Refers to:	Delivered and invoiced Lignite consumed in boilers of TPP According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"	☑
Date of Data:	01/01/2011 – 31/12/2011	☑
Gaps in data	Period: n. a.	☑
	Default value used: n. a.	☑
	Justification: n. a.	☑
	QA/QC aspects	Conclusion and IRL
Source of data	Type: invoices, weight sheets, stock survey .	☑ IRL#22
	Responsibility: TPP coal department.	☑
	Representativeness: The total amount of delivered lignite is weighted by deliverer and invoiced. Incoming waggons are weighted by weigh-bridge for check. Monthly mass balances are representative in accordance with the produced and measured heat.	☑
Reliability of Data Source:	According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"	☑
Is the Data up-to-date?	All data are actual values regarding the reported years.	☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations	☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based	☑

	on the project approved methodology. Cells containing project formulae are locked	
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. No discrepancies have been found and all data are consistent to the calculation tool.	☑
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	The amount of consumed lignite is one component for the calculation of the boiler applied fuel heat. The general energy balance of the power plant that is done anyway gives the possibility of crosscheck in combination with the net calorific value of lignite.	☑

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Table 2

External sources and accounting information *use a separate table for each single parameter*					
	PDD	Meth/Tool	MR	Verified	Conclusion and IRL
Parameter title	Quantity of oil consumed	n. a	Total power plant fuel oil consumption (MR) / Quantity of fuel oil consumed (Calculation tool)	Description of title is consistent.	☑
Parameter ID (if available)	$V_{P,oil}$	n. a	$V_{P,oil}$	Parameter ID is consis-	☑

				tent	
Data Unit	T	n. a	T	Unit is consistent	☑
	Technical aspects				Conclusion and IRL
Description of Data / Data Refers to:	Delivered and invoiced oil consumed in boilers of TPP According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"				☑
Date of Data:	01/01/2011 – 31/12/2011				☑
Gaps in data	Period: n. a.				☑
	Default value used: n. a.				☑
	Justification: n. a.				☑
	QA/QC aspects				Conclusion and IRL
Source of data	Type: invoices, weight sheets, tank level				☑ IRL#22 IRL#23
	Responsibility: Boiler department				☑
	Representativeness: The total amount of delivered oil is weighted by deliverer and invoiced. Incoming waggons are weighted by weigh-bridge for check Monthly mass balances are representative in accordance with the produced and measured heat.				☑
Reliability of Data Source:	According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination".				☑
Is the Data up-to-date?	All data are actual values regarding the reported year 2011.				☑
Archiving of raw data and protection	According to Project Procedure PO – RT – 94 project data are processed within District				☑

measures	Heating Department and are archived on paper and CDs in two different locations.	
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology. Cells containing project formulae are locked.	☑
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. No discrepancies have been found and all data are consistent to the calculation tool.	☑
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	The amount of consumed oil is one component for the calculation of the boiler applied fuel heat. The balances of the boilers, only fired with oil, give the possibility of crosscheck in combination with the net calorific value of fired oil.	☑

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2.5. Other parameters not included in the methodology/tool but included in the PDD

Table 1

Other information *use a separate table for each single parameter*				
	PDD	MR	Verified	Conclusion and IRL
Parameter title	n. a.	Quantity of biomass con-	Quantity of biomass consumed	☑

		sumed		
Parameter ID (if available)	n. a.	$V_{P,biomass}$	$V_{P,biomass}$	☑
Data Unit	n. a.	t/month	t/month	☑
	Technical aspects			Conclusion and IRL
Description of Data / Data Refers to:	Delivered and invoiced biomass consumed in boilers of TPP According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"			☑
Date of Data:	01/01/2011 – 31/12/2011			☑
Gaps in data	Period: n. a.			☑
	Default value used: n. a.			☑
	Justification: n. a.			☑
	QA/QC aspects			Conclusion and IRL
Source of data	Type: invoices, stock survey			☑ IRL#24
	Responsibility: TPP fuel department.			☑
	Representativeness: The total amount of delivered biomass is weighted by deliverer and invoiced.			☑
Reliability of Data Source:	According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"			☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations			☑
Data transfer and protection of input	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI			☑

data for calculations	Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology.	
	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure. Approved monthly reports for the full monitoring period have been supplied.	☑
Data verification	Consistency of raw data with calculation tool: Monthly reports issued by the JI-Department for the full monitoring period have been provided. No discrepancies have been found and all data are consistent to the calculation tool.	☑
	Consistency of calculation tool with monitoring report: All data provided in the Monitoring Reports 2011 are consistent with the annual values in the calculation tool.	☑
Crosscheck (if available)	The amount of consumed biomass is one component for the calculation of the boiler applied fuel heat. The general energy balance of the power plant that is done anyway gives the possibility of crosscheck in combination with the net calorific value of biomass.	☑

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Table 2

Other information *use a separate table for each single parameter*				
	PDD	MR	Verified	Conclusion and IRL
Parameter title	n. a.	Net calorific value of biomass consumed	Net calorific value of biomass consumed	☑
Parameter ID (if available)	n. a.	$CV_{P,biomass}$	$CV_{P,biomass}$	☑

Data Unit	n. a.	kcal/kg	kcal/kg	☑
	Technical aspects			Conclusion and IRL
Description of Data / Data Refers to:	Net calorific value of biomass consumed in boilers of TPP According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"			☑
Date of Data:	01/01/2011 – 31/12/2011			☑
Gaps in data	Period: n. a.			☑
	Default value used: n. a.			☑
	Justification: n. a.			☑
	QA/QC aspects			Conclusion and IRL
Source of data	Type: net calorific value of biomass is provided by the supplier upon delivery			☑ IRL#21
	Responsibility: TPP fuel department.			☑
	Representativeness: The total amount of delivered biomass is weighted by deliverer and invoiced.			☑
Reliability of Data Source:	According to Project Procedure "PO – RT – 81 Power Plant Fuel Consumption Determination"			☑
Archiving of raw data and protection measures	According to Project Procedure PO – RT – 94 project data are processed within District Heating Department and are archived on paper and CDs in two different locations			☑
Data transfer and protection of input data for calculations	According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI Project Department, where the final calculation for CO2 emission reduction is made, based on the project approved methodology.			☑

	Quality of evidence	Conclusion and IRL
Completeness of data	Evidence of completeness of data is provided by the implemented and verified QM-Procedure.	Clarification Request#14 ☑
Data verification	Consistency of raw data with calculation tool: **Clarification Request#14** *Provide copies of invoices of delivered biomass for verification of net calorific value of biomass.*	Clarification Request#14 ☑
	Consistency of calculation tool with monitoring report:	Clarification Request#14 ☑
Crosscheck (if available)	N/A. The share of biomass in total fuel is less than 1.5% and therefore absence of cross-check does not influence on the final calculation result.	☑

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3. Data Processing and ER calculation

Description of data processing from transferred data to final results in the calculation tool		
Step	Description	Conclusion and IRL
Consistency	All abbreviations and units used in the MR and the calculation tool are consistent with the PDD. They are traceable to the raw data what clearly corresponding to parameters.	☑
Calculation Tool description	The single sheets and parameters are clearly described and transparent. The description follows exactly the PDD and the MR. Revision number and issuing date are indicated at the Front Page sheet. **Clarification Request#10** *Clarify why MR numbers are 1 and 4?* **Clarification Request#12** *In the ER excel file for 3 months in 2011, folder "Annex I", the thermal efficiency of the primary district heating network in October is much lower than in November and December, please clarify.* ***Clarification Request#13*** *The efficiencies of the heat conversion substations and in the secondary network given in both Monitoring Reports are not consistent with the corresponding ER calculation files, folder "Annex I System Efficiencies". Clarify how the values in the MRs have been calculated?* ***Correction Action Request#5*** *The Monitoring period indicated on calculation sheet is inconsistent with MR No: 4.* All formulae, intermediate steps and constants described transparently including correct units and in compliance with the registered PDD. The transparent description of the sheets leads to long formula description for the cells with complex calculations. The values are traceable clearly by analysing the related links prop-	*Clarification Request#10* *Clarification Request#12* *Clarification Request#13* *Correction Action Request#5* ☑

	erly.	
Elimination of not plausible data (if applicable)	n. a.	☑
Transformation from useable data to input data for further calculation (if applicable)	n. a.	☑
Ex-ante data	n. a.	☑
Default parameter	Molar masses: M_{CO2} = 44,01 g/mol M_{C} = 12,01 g/mol Carbon factors for fuels: Lignite 27,60 t C/TJ Fuel oil 21,10 t C/TJ These values refer to “Revised 2006 IPCC Guidelines”. Oxidation factors: Are issued by the Ministry of Environment and also used in emission calculation of EU-ETS Lignite 97,00 % Fuel oil 99,50 %	☑
Formulae check	All formulae included in the calculation tool are in compliance with the pictured formulae in the PDD,	☑

	D.1.1.2.	
Rounding functions	There were no rounding functions applied in the Calculation tool. Calculation is due to Excel properties.	☑
Calculation tool changes and protection measures	The final calculation for CO_2 emission reduction is made in the JI Project Department, based on the project approved methodology. According to Project Procedure PO – RT – 82: Management and Monitoring System, Project raw data are processed within the Technical Department, where from are transferred to JI Project Department. Data inputs into the tool are only done by authorised staff members of this department. The blank tool is prepared for data input includes Baseline Data and all calculation steps. **Correction Action Request#6** *In calculation tool the cells containing project formulae are not locked to avoid unintentional typing errors. Lock cells containing formulae and unlock only the input fields.* The calculation tool has not to be modified due to fixed calculation of the emission reduction. New connections to primary and secondary network are considered by measured values that influence the results of the calculation.	Correction Action Request#6 **Fehler! Verweisquelle konnte nicht gefunden werden.** ☑
Reported data	The actual reported data in the Monitoring Reports of the year 2011 are consistent with the results of the corresponding calculation tool.	☑

4. Additional assessment

4.1. Internal Review

Description and performance of internal review		
	Description	Conclusion and IRL
Procedure	The QM-Procedure PO-PT 82 – Management and Monitoring System JI-Project describes the responsibilities of all project involved TPP departments. This procedure has been updated in May 2010 for the following Monitoring Periods. The responsibilities of the JI Project Manager and JI Project Deputy Manager have been split so as to avoid activities overlap as well as to improve the project information and data check/ calculation/ veri-	☑ IRL#9

	fication process (procedure paragraph 5.2.2). The organogram in Annex 1 illustrates the cross-linked structure. The "Annex 2-JI Project Data Handling Process and QA Activities" contents the details regarding acquisition and handling of all necessary data. There were no changes in the Procedure during the Monitoring Period 2011. Finally all data, already approved at the department level are monthly provided to the JI-Department. There the delivered data are reviewed with additional raw data, e.g. daily records. The JI-Department issues a monthly JI-Project report that is reviewed and signed by PM and DPM. The approved data are put into the calculation tool. The Monitoring Report bases upon the annual results and is independently reviewed and signed by PM and DPM.	
Documentation	In the monthly JI-Project report (JI Process Data Log Sheet) the JI-Project Manager has to sign that the review of the data sheet and the data log has been performed and all procedures have been followed.	☑
Responsibilities	The General Director of TPP ROMAG THERMO approves the Project Monitoring Reports finally.	☑

4.2. Peculiarities

Description of Peculiarities and unexpected Daily Events during the verification period		
	Description	Conclusion and IRL
Performance	The project was implemented in steps since October 2006, finished before the end of 2007 and finally accepted in March 2008. This lead to increasing baseline and project emissions in 2008 compared to 2007. In the Monitoring period 2009 baseline and project emissions accordingly the emission reductions decreased by a slightly (4.5 %) increasing district heat delivered to consumers connected to the secondary network. This was caused by a considerable increase (from 23 % in 2008 to 33 % in 2009) of the thermal efficiency of the power plant that leads to a lower total amount of fuel based CO_2 emissions. The performance of the implemented modernisation of the district heating system leads to the expected re-	☑

	sults. There were no further peculiarities in the operation of the system in the Monitoring Period of 2011. The annual maintenance of the whole network is performed in summer season and needs only a couple of days.	
Documentation	n. a.	☑
Measures	There are no additional measures necessary then the implemented procedures and common maintenance.	☑

4.3. Further additional requirements

Description of additional requirements to be checked		
	Description	Conclusion and IRL
environmental issues	There are no additional requirements indicated in the registered PDD.	☑

4.4. Data Reporting

Description of the Monitoring Report		
	Comments and Results	Conclusion and IRL
Compliance with UNFCCC regulations	The project is applying a project specific methodology approach. All requirements from the project specific methodology approach are fulfilled. The Monitoring Plan and the PDD are consistent. Verification periods are: • from 01. January 2011 to 30. September 2011 and • from 01. October 2011 to 31. December 2011. ***Correction Action Request#7*** *Add the explanation to MR why there are two monitoring periods and two MRs for 2011* ***Correction Action Request#10*** *In both Monitoring Reports the Verifier's company name is not stated correctly. The correct name is TÜV SÜD Industrie Service. Correct the error.*	☑ *Correction Action Request#7* *Correction Action Request#10*
Completeness and	The parameters in the MR are clearly described, including why the parameter is reported and how it is con-	☑

Transparency	sidered in the calculation. The calculation formulae according to the registered PDD are a part of the MR.	
Correctness	All of the provided values were correctly transferred from the assessed calculation tool to the MR.	☑

5. Compilation and Resolutions of CARs, CRs and FARs

Corrective Action Requests by audit team			
	Comments and Results	Ref	Conclusion and IRL
Issue	**Correction Action Request#1.** *Information about phased implementation of pipe replacement programme is missing from MR. Provide information.*	1.1	☑ IRL#28
Response	*The project was gradually implemented during the years 2006-2007 and final trials and commissioning took place during the same period.* *Some minor aspects, however not affecting the systems operation (e.g. finalization of pipes, underground ducts, HCS, etc.) were finalized only during the year 2008.* *Accordingly the final documents have been completed as follows:* *1. The final acceptance process for the HCSs: HCS1; HCS2; HCS3; HCS4; HCS5; HCS6; HCS7; HCS8; HCS9; HCS13; HCS17; HCS19; HCS20; HCS21; HCS22; HCS23; HCS24; HCS25; HCS27; HCS29; HCS30; HCS31; HCS32; HCS35; HCS36; HCS38; HCS39; HCS40; HCS41; HCS42; HCS43; HCS53; HCS54; HCS55; HCS59; HCS60; HCS66; HCS67; HCS69) related heat exchangers and auxiliary equipments has been carried out and noted down in Final Acceptance Report no. 325/28.02.2007 and for HCSs Automation Equipments in Final Acceptance Report no. 324/28.02.2007* *2. The final acceptance process for the District Heating Secondary Network has been made in stages and has been noted down as follows:* *2.1.1 Final Acceptance Report no. 323/28.02.2007 for the District Heating Secondary Network related to the following HCSs: HCS6; HCS13; HCS22; HCS23; HCS24; HCS36;*		

	HCS38; HCS39; HCS41; HCS66. *2.1.2 Final Acceptance Report no. 326/13.08.2007 for the District Heating Secondary Network related to the following HCSs: HCS1; HCS2; HCS4; HCS5; HCS7; HCS9; HCS17; HCS19; HCS20; HCS25; HCS30; HCS43; HCS53; HCS59; HCS60.* *2.1.3 Final Acceptance Report no. 334/10.03.2008 for the District Heating Secondary Network related to the following HCSs: HCS3; HCS8; HCS27; HCS29; HCS31; HCS32; HCS35; HCS40; HCS42; HCS54; HCS58; HCS67; PT69.* *A description related to the phased implementation has been included in the MRImplemen-tation* *Copies of Final Acceptance Report no. 326/13.08.2007 and of Final Acceptance Report no. 334/10.03.2008, related to pipe replacement program are provided in Annex CAR_1*		
Assessment	*Relevant information is included in both MRs in chapter 2 on page 4. Issue is closed.*		
Issue	**Correction Action Request#2.** *Data for District heat supplied to primary network in monthly reports issued by the JI-Department are not consistent to the calculation tool. Correct inconsistency.*	2.2 Table 1	☑ IRL#29
Response	*Adequate corrections were made.* *Please see Annex CAR_2 & CAR_3 & CAR_4.*		
Assessment	*District heat supplied to primary network for January, March and April given in the calculation tool ("121115_FINAL_MR 2011_DEA_Jan-Sep.xls") is now consistent with monthly reports issued by the JI-Department. Issue is closed.*		
Issue	**Correction Action Request#3.** *Data for Process steam production in monthly reports issued by the JI-Department are not consistent to the calculation tool. Correct inconsistency.*	2.2 Table 2	☑ IRL#29
Response	*Adequate corrections were made.* *Please see Annex CAR_2 & CAR_3 & CAR_4.*		
Assessment	*Process steam production for 10 months given in the calculation tool ("120816_FINAL_MR 2011_DEA_Jan-Sep.xls") is now consistent with monthly reports issued by the JI-Department. Issue is closed.*		
Issue	**Correction Action Request#4.** *Units in the excel sheet "Heat and Steam_Monthly Calcula-*	2.2	☑

	tion Methodology_2011.xls" are missing. Include units.	Table 2	IRL#29
Response	*Adequate corrections were made.* *Please see Annex CAR_2 & CAR_3 & CAR_4.*		
Assessment	*Units for Process steam production and District heat supplied to primary network (Gcal/month) are indicated now in JI-Department report "120816_Heat and Steam_Monthly Calculation Methodology_2011.xls". Issue is closed.*		
Issue	**Correction Action Request#5.** *The Monitoring period indicated on calculation sheet is inconsistent with MR No: 4.*	3	☑
Response	*Adequate correction was made.* *Please see:* *120816_FINAL_MR 2011_DEA_Jan-Sep* *120816_FINAL_MR 2011_VER_Oct-Dec*		
Assessment	*The correct Monitoring Period 01 January 2011 – 30 September 2011 is now indicated on calculation sheet "120816_FINAL_MR 2011_DEA_Jan-Sep.xls". The issue is closed.*		
Issue	**Correction Action Request#6.** *In calculation tool the cells containing project formulae are not locked to avoid unintentional typing errors. Lock cells containing formulae and unlock only the input fields.*	3	☑
Response	*Adequate correction was made* *Please see:* *120816_FINAL_MR 2011_DEA_Jan-Sep* *120816_FINAL_MR 2011_VER_Oct-Dec*		
Assessment	*The calculation worksheets in calculation tools "120816_FINAL_MR 2011_DEA_Jan-Sep.xls" and "120816_FINAL_MR 2011_VER_Oct-Dec.xls" are locked for editing now. The issue is closed.*		
Issue	**Correction Action Request#7.** *Add the explanation to MR why there are two monitoring periods and two MRs for 2011.*	4.4	☑

Response	*The Monitoring Report referring to 2011 has been issued with two components, namely:* • *the first MR component, corresponding to the period 01 January 2011 – 30 September 2011, numbered as MR no. 4.1, should cover the ERUs generated up to the limit of Double Counting as per Romanian NAP,* • *the second MR component corresponding to the period 01 October 2011 – 31 December 2011, numbered as MR no. 4.2, should cover ERUs generated up to the end of the year 2012.* *It is expect one single Verification Report which shall mention the amount of ERUs generated up to the Double Counting limit and the difference of ERUs generated by the end of the year 2011.* *In this way it will be very clear what is the amount of ERUs to be transferred under JI rules and what is the total ERUs amount generated along 2011.* *Is to be pointed out that:* • *the Project Double Counting as per Romanian NAP is : 293,285 tCO2, the total quantity of ERUs generated along the period 2008 – 2010 is: 247,936 t CO2, (2008 ÷10,054 tCO2 ; 2009 ÷ 71,016 tCO2 ; 2010 ÷: 66,566 tCO2).*		IRL#37 IRL#38
Assessment	*The explanation given here is sufficient; however this text has not been added to MRs.* *The issue is not closed yet.*		
Response loop 2	*Explanation has been included within the MRs.*		
Assessment loop 2	*The notification added to MRs 4.1 and 4.2 v4 is confusing and is not understandable for a third party. What is meant by "Project Double Counting"? Please clarify and provide reference documents.* *Referenced ERUs for 2008 and 2009 are incorrect. Correct the error.*		
Response loop 3	*Respective notification has been revised and reference ERUs have been updated. Please also see official letter from Project Host and the Danish Energy Agency addressed to the Romanian Ministry.* *[100715 DEA letter (sign & stamps) to ROMoEF ref double counting Drobeta Turnu Severin]* *[100714_pozitia_oficiala_a_RAAN ROMAG TERMO_catre MMP].*		

Assessment loop 3	*The additional explanation given (MRs version 6 from 15.12.2012) is now referring to letters from Project Host and the Danish Energy Agency addressed to the Romanian Ministry. This explains why PP has issued two MRs: ERUs generated above the limit specified in Romanian NAP are not the subject for JI and transfere of them will be decided separately. The issue is clarified.*		
Issue	**Correction Action Request#8.** *Include dates of last revision of each monitoring procedure in Description of monitoring methods and equipment in both Monitoring Reports.*	1.3	☑
Response	*Adequate corrections were made.* *Please see* *120816_FINAL_MR 2011_DEA_Jan-Sep* *120816_FINAL_MR 2011_VER_Oct-Dec* *And* *Annex JI Project Procedures*		
Assessment	*Dates of last revision for each monitoring procedure is indicated now in Description of monitoring methods and equipment in both Monitoring Reports. The issue is closed.*		
Issue	**Correction Action Request#9.** *In both Monitoring Reports chapter 6.2 states that no adjustments of monitoring methods and equipment were not necessary. However it is not consistent with the fact that combustion of biomass is used up from 2010 which was not foreseen in the registered PDD. Correct MR-s!*	1.3	☑ IRL#30
Response	*Adequate corrections were made.* *Please see* *120816_FINAL_MR 2011_DEA_Jan-Sep* *120816_FINAL_MR 2011_VER_Oct-Dec* *And* *Confirmation letter from Romanian Ministry* *CAR_9_Romanian* *CAR_9_English Translation*		
Assessment	*There is no explanation given how the monitoring methods and equipment were adjusted in rela-*		

	tion with combustion of biomass in chapter 6.2 neither of MRs. The issue is not closed.		
Response loop 2	*Explanation has been included within the MRs.*		
Assessment loop 2	*Appropriate explanation has been added to MRs 4.1 and 4.2 v4 into chapter 6.2. Adjustments in* *The monitoring methods where adjusted in order to monitor the biomass consumption (Changes in respect to the calculation formulas, monitoring parameters as well as respective monitoring procedures and forms are marked in RED for transparency reasons). See also chapter 2.5 tables 1 and 2.* *The issue is closed.*		
Issue	**Correction Action Request#10.** *In both Monitoring Reports the Verifier's company name is not stated correctly. The correct name is TÜV SÜD Industrie Service. Correct the error.*	4.4	☑
Response	*Respective changes have been made.*		
Assessment	*The Verifier name is correct now (MRs version 6 from 15.12.2012). The issue is closed.*		
Clarification Requests by audit team			
	Comments and Results	Ref	Conclusion and IRL
Issue	**Clarification Request#1.** *Provide copies of documents indicating the length of rehabilitated and modernised secondary heat network*.	1.1	☑ IRL#31
Response	*According with PDD, page 8, "Table 1 – Total length of heating pipes to be laid down"- the total length of rehabilitated and modernized secondary heat network is 95,533 m.* *According with the Project Feasibility Study / Definite Design the estimated total length of rehabilitated and modernized secondary heat network is 107,908 m.* *Please see Annex CR_1 and CR_2* *(The difference between the above quantities is about 12% and is due mainly to the optimization and redesign of the original heat and hot potable water pipes trenches)*		
Assessment	*The explanation is given how and how much was planned to rehabilitate. However the executed lengths of rehabilitation are not given. The copies of original documents indicating the progress*		

	of these works should also be provided. The issue is not clarified yet		
Response loop 2	*Respective confirmation letter has been provided by the Project Proponent.*		
Assessment loop 2	*Respective confirmation letter contains information regarding the length and diameters of rehabilitated and modernised secondary heat network: length 107.6 km and DN 20 – 250 mm. This information corresponds to the findings on-site. The issue is clarified.*		
Issue	**Clarification Request#2.** *Provide copies of documents indicating the length of rehabilitated and modernised secondary hot potable water network.*	1.1	☑ IRL#31
Response	*According with PDD, page 9, "Table 2 – Total length of hot portable water pipes to be laid down"- the total length of rehabilitated and modernized secondary heat network is 95,219 m.* *According with the Project Feasibility Study / Definite Design the estimated total length of rehabilitated and modernized secondary heat network is 107,908 m.* *Please see Annex CR#1 and CR#2* *(The difference between the above quantities is about 12% and is due mainly to the optimization and redesign of the original pipes trenches)*		
Assessment	*The explanation is given how and how much was planned to rehabilitate. However the executed lengths of rehabilitation are not given. The copies of original documents indicating the progress of these works should also be provided. The issue is not clarified yet*		
Response loop 2	*Respective confirmation letter has been provided by the Project Proponent.*		
Assessment loop 2	*Respective confirmation letter contains information regarding the length and diameters of rehabilitated and modernised secondary hot potable water network: length 107.6 km and DN 20 – 100 mm. This information corresponds to the findings on-site. The issue is clarified.*		
Issue	**Clarification Request#3.** *Clarify the numbers of new consumers for 2011 for both Monitoring periods (from January 2011 to September 2011 and from October 2011 to December 2011). Provide copies of relevant documents.*	1.1	☑
Response	*The tables containing the way the New Consumers evolved along 2007 – 2011 period, within the Monitoring Reports (both periods) were corrected.* *The new consumers are identified as follows:*		

	• *All new consumers, in order to be connected either on primary network or secondary network must conclude a heat supply contract with ROMAG TERMO PP,* • *Each year, based on the date of the first Invoice issued for the consumed heat, every new consumer is registered "as new consumer" until the end of the year.* *Please see Annex CR_3 – Which provides relevant documents for the new consumers' registration.*		
Assessment	*Table clarifying the number of new consumers has been included into MRs to the end of chapter 7. The issue is clarified.*		
Issue	**Clarification Request#4.** *Provide copies of calibration certificates for metering equipment in following locations:* *Private House – Druga Dumitru; 38 Gheorghe Titeica St;* *Private House – Marica Stefan;16 Decebal St.*	2.1	☑ IRL#32
Response	*Please see Annex CR_4 – Which provide copies of the requested calibration certificates*		
Assessment	*The relevant documents were provided. The issue is clarified.*		
Issue	**Clarification Request#5.** *Provide copies of replacement protocols for equipment calibrated 20.02.12.*	2.2 Table 1	☑ IRL#33
Response	*Copies of the requested replacement protocol as well as calibration certificates for equipment calibrated on 20.02.12 are provided.* *Please see Annex CR_5*		
Assessment	*The relevant documents were provided. The issue is clarified.*		
Issue	**Clarification Request#6.** *Clarify why the procedures PO-MCRTH 14 issuance and revision dates are the same.*	2.2 Table 2	☑ IRL#19
Response	*Adequate corrections were made.* *Please see Annex JI Project Procedures*		
Assessment	*Correct issuance date (1.7.2009) and revision date (20.5.2010) are indicated now for the procedure PO-MCRTH 14. The issue is clarified.*		

Issue	**Clarification Request#7.** *Provide copies of monthly reports for district heat supplied to:* *(i) heat conversion substations* *(ii) consumers connected to the primary network* *(iii) secondary network* *(iv) consumers connected to secondary network* *(v) new consumers connected to the primary network* *(vi) new consumers connected to the secondary network* *issued by the District Heating Department.*	2.2	☑ IRL#34
Response	*Copies of the requested monthly reports are provided.* *Please see Annex CR_7.*		
Assessment	*The relevant documents were provided. The issue is clarified.*		
Issue	**Clarification Request#8.** *Provide copies of replacement protocols and calibration of previu-osly installed metering equipment for Block of flats – Corneliu Savoiu 3, block A1 entrance 5.*	2.2 Table 6	☑ IRL#35
Response	*Copies of the requested documents are provided.* *Please see Annex CR_8.*		
Assessment	*The relevant documents were provided. The issue is clarified.*		
Issue	**Clarification Request#9.** *Clarify why hot water flowmeters at private houses – Gheorghe Anghel 41 and Adrian 159A do not have serial number indicated and is not calibrated.*	2.2 Table 7 Table 8	☑ IRL#36 IRL#39
Response	*The flowmeters do have serial number.* *Copies of the calibration certificates are provided.* *Please see Annex CR_9.*		
Assessment	*The relevant documents were provided. However the evidence of presence of serial numbers on site is not provided. Provide photos proving that serial numbers on documents provided for this CR and actual numbers on site are the same.*		
Response loop 2	*Respective prove has been provided*		

	[121205_House Conected to Secondary Network_ Adrian 159 A] *[121205_House Conected to Primary Network_Gheorghe Anghel 41]*		
Assessment loop 2	*The photos provided are showing the correct serial numbers which are also indicated on the certificates provided before. The issue is clarified.*		
Issue	**Clarification Request#10.** *Clarify why MR numbers are 1 and 4?*	3	☑
Response	*Corrections were made, as follows:* *The Monitoring Report referring to 2011 has been issued with two components, namely:* • *the first MR component, corresponding to the period 01 January 2011 – 30 September 2011, is numbered as MR no. 4.1, (cover the ERUs generated up to the limit of Double Counting as per Romanian NAP),* • *the second MR component corresponding to the period 01 October 2011 – 31 December 2011, is numbered as MR no. 4.2, (cover ERs generated up to the end of the year 2012).*		
Assessment	*The MRs are numbered now as following: for the period 01.01.11 – 30.09.11 MR no: 4.1 and for the period 01.10.11 – 31.12.11 MR no: 4.2. The issue is clarified.*		
Issue	**Clarification Request#11.** *Clarify why the process steam production in June 2011 was much lower than the other months?*	2.2 Table 2	☑
Response	*The process steam demand of the Heavy Water Facility is communicated to ROMAG TERMO on annual basis and it is later confirmed each month in accordance with the effective needs.* *Copies of the relevant related documents cannot be delivered.*		
Assessment	*The process steam production depends on the ordered (and produced) quantity of heavy water. In June 2011 the ordered heavy water quantity was lower than average. The issue is clarified.*		
Issue	**Clarification Request#12.** *In the ER excel file for 3 months in 2011, folder "Annex I", the thermal efficiency of the primary district heating network in October is much lower than in November and December, please clarify.*	3	☑
Response	*October is usually a transitory period for district heating systems representing normally the first month of the heating season.*		

	During this month, most of the heat consumers consume heat only occasionally (mainly during the nights) therefore the heat demand is much lower compared to November and December. *This is due on one hand to the fact that the outside temperatures just start to decrease and on the other hand to the fact that the heat tariff for domestic consumers is not subsidized.* *The subsidies for domestic consumers are granted started with November.*		
Assessment	*The explanation is sufficient, The issue is clarified.*		
Issue	**Clarification Request#13.** *The efficiencies of the heat conversion substations and in the secondary network given in both Monitoring Reports are not consistent with the corresponding ER calculation files, folder "Annex I System Efficiencies". Clarify how the values in the MRs have been calculated?*	3	☑
Response	*There is no contradiction concerning the calculation mode in the afore mentioned documents, because:* *According to Monitoring Reports 4.1 (and PDD):* *The thermal efficiency of the heat conversion substations is calculated as follows:* $\eta_{P,HCS} = \frac{Q_{P,DH,secondary}}{Q_{P,DH,HCS}}$ where: $\eta_{P,HCS}$ thermal efficiency of the heat conversion substations [%] $Q_{P,DH,secondary}$ district heat supplied to secondary network [Gcal] $Q_{P,DH,HCS}$ district heat supplied to heat conversion substations [Gcal] *According with ER calculation files, folder "Annex I System Efficiencies" 4.1:* *The thermal efficiency of the heat conversion substations is calculated as follows:*		

	='INPUT DATA_ENERGY PRODUCTION'!G10/'INPUT DATA_ENERGY PRODUCTION'!F10, where: ➢ 'INPUT DATA_ENERGY PRODUCTION'!G10 means District heat supplied to secondary network ➢ INPUT DATA_ENERGY PRODUCTION'!F10 meansDistrict heat supplied to heat conversion substations *According to Monitoring Reports 4.1 (and PDD):* *The thermal efficiency of the secondary network is calculated as follows:* $\eta_{P,\text{secondary}} = \frac{Q_{P,DH,consumers} + Q_{P,DH,\text{sec.}new\_con}}{Q_{P,DH,\text{secondary}}}$ where: $\eta_{P,\text{secondary}}$ thermal efficiency of the secondary network [%] $Q_{P,DH,\text{secondary}}$ district heat supplied to secondary network [Gcal] $Q_{P,DH,consumers}$ district heat supplied to consumers connected to the secondary network [Gcal] $Q_{P,DH,\text{sec.}new\_con}$ district heat supplied to new consumers connected to the secondary network *According with ER calculation files, folder "Annex I System Efficiencies" 4.1:* *The thermal efficiency of the secondary network is calculated as follows:* =('INPUT DATA_ENERGY PRODUCTION'!H10+'INPUT DATA_NEW CONNECTIONS'!E11)/'INPUT DATA_ENERGY PRODUCTION'!G10, where: ➢ 'INPUT DATA_ENERGY PRODUCTION'!H10 means District heat supplied to consumers connected to the secondary network ➢ 'INPUT DATA_NEW CONNECTIONS'!E11 means District heat supplied to new consumers connected to the secondary network ➢ 'INPUT DATA_ENERGY PRODUCTION'!G10 means District heat supplied to secondary		

	network QED		
Assessment	*The explanation given above is correct but confusing, The formulae used in calculation sheet and MR are identical. However figures in calculation sheet and MR 4.2 are not identical:* *In MR 4.2 page 11 it is stated that thermal efficiencies of the heat conversion substations is 98% and in the secondary network it is 85%. However from the calculation sheet the average values would be calculated 97% and 89% correspondingly. Explain the difference. The issue is not clarified yet.*		
Response loop 2	*The respective efficiencies within the MRs have been revised to 94% for the heat conversion substations and 82% for the secondary network, calculating a total system efficiency over the secondary heating system of 94% x 82% = 77%.* *These efficiencies represent the baseline efficiencies derived from a 1 month measurement campaign carried out in January 2005 on selected heat conversion substations and associ-ated distric heat consumers.* *The efficiencies of 97% and 89% represent the actual average efficiencies under the project ac-tivity (after rehabilitation), calculated for heat conversion substations and the secondary heating system, respectively.*		
Assessment loop 2	*Appropriate corrections have been made to MRs 4.1 and 4.2 v4. The issue is clarified.*		
Issue	**Clarification Request#14.** *Provide copies of invoices of delivered biomass for verifica-tion of net calorific value of biomass.*	2.5 Table 2	☑
Response	*Copies of the invoices for the delivered biomass are provided.* *Please see Annex CR_14.1* *It is to be pointed out that the invoices do not contain any information about the NCV (net calo-rific value) of the biomass.* *The NCV is determined by a third party accredited laboratory based on the samples taken on the site by the ROMAG TERMO staff.* *Certificates for the NCV are provided.* *Please see AnnenxCR_14.2*		

Assessment	*Required documents were provided. The issue is clarified.*		

Forward Action Requests by audit team			
	Comments and Results	Ref	Conclusion and IRL
Issue	**Forward Action Request#1.** *The procedure of distinguishing between old and new consumers is somehow confusing and not documented properly. There should be a documented procedure to distinguish between old consumers and the new ones.*	1.1	☑
Response	*A specific procedure will be drawn up and at hand during the next verification*		
Assessment	*Will be verified during next audit. The issue is closed for now.*		

Annex 2: Information Reference List

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in JI Context)
		Onsite interview (05/06/2012) was carried out by TÜV SÜD: **Verification Team:** Nikunj Agarwal: ATL, TÜV SÜD Munich, Germany Madis Maddison: GHG Verifier, TÜV SÜD **Interviewed Persons:** Bobu Boris: Support Mihai Brasoveanu: Danish Energy Agency , LPC Romania Alin Palcu: Director ROMAG TERMO Socolescu Cristinel: Dir. Adj. Producţie Dumangiu Cornel: Sef Secţie Termoficare Dobjanschi Lelia: Ing. Compartiment Mediu Ciocionoiu Viorel: Operator Staţii Pompe	22/04/2011	
0.	UNFCCC Webpage (JI)	"Energy Efficiency Improvement of the District Heating System in Drobeta Turnu-Severin" http://ji.unfccc.int/JIITLProject/DB/09PG38GL1EVUCD8D8JUNQEI4RPHUVJ/details	Last update 17/10/2012	*Reference to the PDD/MR chapter or JI requirement*
1.	Grue & Hornstrup	JI PDD "Engery efficiency improvement of the district heating system in Drobeta Turnu-Severin, V 8	07/11/2009	JI PDD
2.	ROMAG-TERMO	Monitoring Report January – September 2011 (version 01) Monitoring Report October - December 2011 (version 01)	06/03/2012	*First MRs for GSP*
3.	ROMAG-TERMO	120307_FINAL_MR 2011_DEA_Jan-Sep.xls (Version 01)	06/03/2012	*ERU calculation*

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in JI Context)
		120307_FINAL_MR 2011_VER_Oct-Dec.xls (Version 01)		*tools, first GSP version*
4.	Grue & Hornstrup	Monitoring Plan, Guidelines and Procedures, Version 4	11/07/2009	
5.	TÜV SÜD	Third Periodic verification report. Report no 600500556	19/07/2011	
6.	ROMAG-TERMO	ROMAG TERMO TPP - Main Equipment Technical Features	22/03/2011	
7.	ROMAG-TERMO	Calibration and validity permits for steam and heat metering system	National Institute for Metrology 2004 - 2012	*Steam and heat output, heat to consumers*
8.	ROMAG-TERMO	PO – RT 81 Fuel consumption	Internal document – March 2010	
9.	ROMAG-TERMO	Management and monitoring system –Project JI QM System operational procedure Code PO – RT 82 Edition 1, Revision 2	March 2010	
10.	ROMAG-TERMO	Fuels Calorific values determination Project JI QM System operational procedure Code: PO – RT 78 Edition 1, Revision 1Coal calorific value determination	May 2009	*Laboratory standard*
11.	ROMAG-TERMO	Data collection during emergency situations Project IJ QM system operational procedure Code: PO – RT 84 Edition 1, Revision 1	Internal document – May 2009	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in JI Context)
		(Data collection during emergencies (back-up))		
12.	ROMAG-TERMO	Determination of the power plant heat and steam delivered to the consumers JI project QM system operational procedure Code: PO – RT 94 Edition 1, Revision 1 Heat and steam recording procedure	Internal document – May 2009	
13.	ROMAG-TERMO	PO – RT 83 Personnel training procedure	May 2009	
14.	Grue & Hornstrup	JI Project Training participation lists	07/02/2012	
15.	ROMAG-TERMO	Coal consumption, daily records	31/05/2012	
16.	ROMAG-TERMO	JI Process Data Log Sheet	Jan 2011 – Dec 2011	*Monthly reports, CAR#2, CAR#3, CAR#4*
17.	S.C. Filiala ICEMENERG S.A. Bucarest	Determination of oxidation factor, 2009	31.03.2009	
18.	APM MH	LEA Reports, Semi Annual QA – Checklist for local EPA, 2011	26/08/2011 and 03/02/2012	
19.	ROMAG-TERMO	PO-MCRTH 14, Internal QM-Procedure, Technical Media	July 2009	*CR#6*
20.	ROMAG-TERMO Sectie Combustibil	Monthly net calorific values for lignite and oil, year 2011	2012	*Cross check of reports*

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in JI Context)
21.	ROMAG TERMO	Monthly lower net calorific value of biomass 2011	2012	
22.	ROMAG-TERMO JI Project Manager	Summary of lignite and oil consumption, year 2011	2012	*Cross check of reports*
23.	ROMAG-TERMO JI Project Manager	Summary of fuel oil consumption, year 2011	2012	*Cross check of reports*
24.	ROMAG-TERMO JI Project Manager	Summary of biomass consumption, year 2011	2012	*Cross check of reports*
25.	ROMAG-TERMO Sectie Combustibil	Single consumption sheets of lignite and oil, year 2011	2012	*Cross check of reports*
26.	ROMAG-TERMO	Final Monitoring Reports 2011,Version 06 (MR 4.1 and MR 4.2)	05/12/2012	
27.	ROMAG-TERMO	121205_FINAL_MR 2011_DEA_Jan-Sep.xls (Version 06) 121205_FINAL_MR 2011_VER_Oct-Dec.xls (Version 06)	05/12/2012	*ERU calculation tools, final revised version*
28.	ROMAG TERMO	Final Acceptance Reports no. 326 and no. 334	13/08/2007 and 10/03/2008	*CAR#1*
29.	ROMAG TERMO	120816_Heat and Steam_Monthly Calculation Methodology_2011.xls	16/08/2012	*CAR#2, CAR#3, CAR#4*
30.	Romanian Ministry of Environment and Forests	Confirmation letter No: 17559/FM	11/05/2011	*CAR#9*
31.	ROMAG TERMO	Memorandum indicating the length of rehabilitated and modernized secondary heat and hot potable water networks.	29/10/2012	*CR#1, CR#2*

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date(dd/mm/yyyy)	Additional Information (Relevance in JI Context)
32.	ROMAG TERMO	Calibration certificates for metering equipment in following locations: Private House – Druga Dumitru; 38 Gheorghe Titeica St; Private House – Marica Stefan;16 Decebal St.	2011	*CR#4*
33.	ROMAG TERMO	Replacement protocols for equipment calibrated 20.02.12.	20/02/2012	*CR#5*
34.	ROMAG TERMO District Heating Department	Monthly reports for supplied district heat	2011	*CR#7*
35.	ROMAG TERMO	Replacement protocols and calibration of previuosly installed metering equipment for Block of flats – Corneliu Savoiu 3, block A1 entrance 5	13/04/2010	*CR#8*
36.	ROMAG TERMO	Calibration certificates for hot water flowmeters at private houses – Gheorghe Anghel 41 and Adrian 159A	2010	*CR#9*
37.	ROMAG TERMO	Official letter from Project Host addressed to the Romanian Ministry	14/07/2010	*CAR#7*
38.	Danish Energy Agency	Official letter from Danish Energy Agency addressed to the Romanian Ministry	08/07/2010	*CAR#7*
39.	ROMAG TERMO	Photos of the hot water flowmeters at private houses – Gheorghe Anghel 41 and Adrian 159A	05/12/2012	*CR#9*