



VERIFICATION REPORT

GEOHERMAL ENERGY IN ORADEA – AREA II AND BEIUS IN ROMANIA

(ITL Project ID: RO1000081)

Monitoring Period:
1 January 2011 to 31 January 2011

REPORT No. 2012-0378

REVISION No. 01



DET NORSKE VERITAS



VERIFICATION REPORT

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Approved by Ole A. Flagstad	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: Danish Energy Agency	Client ref.: Mihai Brasoveanu

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Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the "Geothermal Energy in Oradea – area II and Beius in Romania" (ITL Project ID RO1000081), JI Track 1 project, for the period 1 January 2011 to 31 January 2011.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (Version 02) of 14 September 2012 are fairly stated and are accurate and free of material errors, omissions, or misstatements.

The GHG emission reductions were calculated correctly on the basis of the monitoring plan contained in the Project Design Document of July 2004, version 2.3.

DNV Climate Change AS is able to verify that the emission reductions from the "Geothermal Energy in Oradea – area II and Beius in Romania" during the period 1 January 2011 to 31 January 2011 amount to **30 338** tonnes of CO₂ equivalent.

Report No.: 2012-0378	Subject Group: Environment	
Report title: Geothermal Energy in Oradea – area II and Beius in Romania		
Work carried out by: Zuzana Andrtová, Mario Vöröš		
Work verified by: Ole A. Flagstad		
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Abbreviations

AIE	Accredited Independent Entity
ARCE	Romanian Agency for Energy Consumption
BS	Baseline Study
CAR	Corrective Action Request
CEF	Carbon Emission Factor
CHP	Combined heat and power
CET	Centrala Electrica de Termoficare
DEA	Danish Energy Agency
DH	District heating
DNV	Det Norske Veritas Certification AS
EPA	Environmental protection agency
ERU	Emission Reduction Units(s)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
MP	Monitoring Plan
PDD	Project Design Document
QA	Quality Assurance

Conversion Factors and Definitions

GJ to kWh	1 GJ = 277.78 kWh
kWh to J	1 kWh = 3 600 000 J
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
GES	Gross energy supply (total energy demand of DH system including losses in boiler system, in distribution pipe network, under buildings)
NED	Net energy demand (energy demand in buildings, excluding losses in basement)



1 INTRODUCTION

Danish Energy Agency has commissioned DNV Climate Change Services AS (DNV) to carry out the verification of the emission reductions reported for the “Geothermal Energy in Oradea – area II and Beius in Romania” (the project) in the period 1 January 2011 to 31 January 2011. This report contains the findings from the verification and a verification statement for the certified emission reductions.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by an Accredited Independent Entity (AIE) of the monitored reductions in GHG emissions that have occurred as a result of a Joint Implementation (JI) project activity during a defined monitoring period.

The objective of this verification was to verify the emission reductions reported for the “Geothermal Energy in Oradea – area II and Beius in Romania” for the period 1 January 2011 to 31 January 2011.

DNV is an Independent Entity accredited by the Joint Implementation Supervisory Committee (JISC) for all sectoral scopes.

1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material errors, omissions, or misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

1.3 Description of the Project Activity

Project Participants:	S.C. Transgex S.A. in Romania (Host) and the Danish Energy Agency (DEA) in Denmark
Title of project activity:	Geothermal Energy in Oradea – area II and Beius in Romania
ITL Project ID:	RO1000081
Project Entity/Contacts:	Mr. Alin Iacobescu, Director General of Transgex Str. Vasile Alecsandri nr. 2, Oradea Bihor 410072 Tel./Fax: +40 259 431 965 / 040 256 413 022 E-mail: transgex@rdsor.ro Mr. Mihai Brasoveanu, Task Manager for Climate Change within DEA Romania



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Location of the project activity: Oradea and Beius (Romania)

Project's Kyoto crediting period: 1 January 2008 to 31 December 2012

Period verified in this verification: 1 January 2011 to 31 January 2011

The project is proposed as a JI Track-1 project between Romania and the DEA and includes the upgrade and development of the district heating system (DHS) of two cities (Oradea - Area II and Beius) in Romania. The project aims to substitute previously used fossil fuels (lignite and heavy oil) with geothermal energy resources.

The project generates CO₂ emission reductions originating from the substitution of fossil fuels by geothermal energy resources.

1.4 Methodology for Determining Emission Reductions

The project aims to substitute previously used fossil fuels (lignite and heavy oil) with geothermal energy resources. It means that the project generates CO₂ emission reductions originating from the substitution of fossil fuels by geothermal energy resources.

The emission reductions are calculated of base consumption energy in localities defined as Area II in Oradea and in Beius City, which was previously connected in CET I plant in Oradea and which are connected to wells 3001 and 3003 in Beius and previously was connected to Beius DHS.

The emission reduction in Oradea - Area II are calculated as difference between estimated emissions from combustion of natural gas, fuel oil and lignite and emissions from natural gas fired peak load boilers at the geothermal heating plant with emissions produced by electricity produced from other fossil fired power plants, which increase in result of no production in CET I.

The emission reductions in Beius are calculated as emission from combustion of heavy oil and natural gas, which is replaced by geothermal energy of JI project.

The monitored parameters are quantity of supplied energy from geothermal heating plant in Oradea, energy supplied to block of flats, hospitals and other buildings in Beius as defined boundaries (Area II and Beius) in the PDD /13/.

2 METHODOLOGY

DNV has assessed and determined that the implementation and operation of the project activity, and the steps taken to report emission reductions comply with JI criteria and relevant guidance provided by the JI Supervisory Committee.

The assessment involved a desk review of relevant documentation as well as an on-site visit(s).

Verification team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>
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				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA1.2 competence
Team leader (Verifier)	Andrtová	Zuzana	Czech Republic	✓	✓	✓	✓		✓
Verifier	Vöröš	Mario	Czech Republic	✓	✓	✓			✓
Technical reviewer								✓	✓

Duration of verification

Preparations:

2 March 2012

On-site verification:

*From 13 March 2012 to 14 March 2012*Reporting, calculation checks and QA/QC: *From 19 March 2012 to 16 October 2012***2.1 Review of Documentation**

The basic document reviewed during the desk review was Monitoring report for period 1 January 2011 to 31 January 2011 /1/ including its excel annex for calculation of emission reduction version 1 dated 8 February 2012 /2/.

In addition to the monitoring documentation provided by the project participants and reviewed during desk review:

- (a) The registered PDD version 2.3 from July 2004 /13/;
- (b) The Monitoring plan version 2.3 from July 2004 /14/
- (c) The Unqualified validation report for the project produced by SGS /15/;
- (d) Previous verification reports for years 2008, 2009 and 2010 /16/;
- (e) Relevant decisions, clarifications and guidance from the CMP and the JISC /17/~21/;

The Unqualified validation report /15/ was used for determination purpose because it was concluded prior to the establishing of JI Track 1 procedure in Romania /17/. DNV also notes that the PDD registered by the Romanian authorities /13/ is dated prior to the Unqualified validation report /15/, but DNV concludes that Romanian authorities has found this PDD sufficient for JI track-1 in Romania as it is registered as the official PDD for the project.

The local records as calibration protocols for measurement devices /3/, records from monitoring sites /4//7/, local EPA records /8/, CET data /5/, invoices for natural gas /6/, Project procedures /11/, QA/QA records /9/ and training records /10/ were provided to demonstrate project implementation on site.

The requested update of monitoring report, which arises from small incorrectness and inconsistencies, were realized in second version of Monitoring report /1/ dated 14 September 2012.



2.2 Site Visits

The Oradea's office of Transgex, individual measured points as well as geothermal heat plant were visited on 14 and 15 March 2012 by Zuzana Andrtová and Mario Vöröš of DNV. During this site visit, the representatives of DNV interviewed key personnel of the Transgex's management, DEA representative and consultant participated on development of the monitoring report as well as further responsible persons. DNV verified that the project was realized according to PDD /13/ and Monitoring plan /14/ except deviation described in the monitoring report, which were verified during the previous verifications /16/. These deviations do not have influence to accuracy of the monitored parameters and they don't change the baseline interpretation. The records related to measurement devices /3/ were confirmed by the real situation on individual monitoring points. The heat consumption was verified by cross-checking with primary records from reading of measurement /4/ and with primary records of individual follow or heat meters /7/. The other supporting documents /5//6//12//11/ presented by Transgex confirmed correctness of rest input parameters in the excel attachment /2/ and QA/QC process of this project.

2.3 Closing out of verification findings

The objective of this phase of the verification was to resolve any issues which needed be clarified prior to DNV's conclusion that i) the project activity has been implemented and operated in accordance with the PDD, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan and iii) the data and calculation of GHG emission reductions are correct.

A corrective action request (CAR) is issued, where:

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

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable JI requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

One CAR related to small inconsistency, one CL related to calibration status of individual measurement devices and one FAR related to traceability of individual measurement devices has been identified. CAR and CL were properly addressed by project proponent in final version of the Monitoring report and also forward action plan for FAR was found as suitable.



3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the “Geothermal Energy in Oradea – area II and Beius in Romania” for the period 1 January 2011 to 31 January 2011.

3.1 Remaining issues, CARs, FARs from previous verification

No open FAR were remained from previous verification.

3.2 Project implementation

The project was determined prior to the establishment of Track I procedures in Romania /17/. Some technical presumptions from the determination were not realized (increasing efficiency of CET I due to modernization, connection of local consumers to well 4767 etc.). Project is in compliance with description in the PDD /13/ except the connection of local consumers to well 4767.

The connection of consumers in area Beius, available through connection to two wells (3001 or 3003), is increasing and it is variable as it depends on contracts with consumers. The situation is fully in accordance with the PDD /13/.

The demonstration of no modernization of CET I is annually presented as well as real data from the monitoring period (related to energy, heat and fuels) by S.C. Electrocentrale Oradea S.A. during the site visit /5/. The data are correctly applied in the calculation of emission reduction /2/ for the same period.

Monitoring points are established in consumers places (Beius) and in geothermal heating plant /3//4/ with collection of certificates for the same. The validity of all was confirmed during the site visit and corresponds with the PDD /13/. The calibration of the metering devices is realized in 4 years intervals, which is shorter period than is supposed in the PDD /13/ but the period is requested by local legislation. As the calibration period is shorter than in the PDD /13/ thus fulfils sufficiently PDD’s requirements. The details related to measurement devices are provided below in the chapter 3.3.

Data handling was focus of improvement in time from previous verification and current situation is on standard level, which provides good results in traceability, monitoring and archiving of all data from primary sources to emission reduction calculation and presentation.

All wells were in operation during the monitored period and the operational time is correctly reflected in second version of excel attachment /2/ of Monitoring report.

DNV can confirm that that the physical location, emission sources, baseline scenario of the project has not changed and the changes related to technical assumptions are consistent with the JI specific approach upon which the determination was prepared for the project. From the technical point of view these changes do not create any specific problems and are acceptable. Hence DNV confirms that the conditions defined by the paragraph 33 of the JI guidelines (Data used share reliable and provide a transparent picture of the emission reductions or enhancements of net removals monitored.) are still met for the project and the original determination opinion does not change.



3.3 Compliance with monitoring plan

The monitoring has been carried out in accordance with the Monitoring plan of July 2004, version 2.3 /14/.

The below tables describe for each parameter, which is to be measured according to the monitoring plan, how DNV has verified that i) the actual monitoring complies with the monitoring plan and that ii) data have been assessed to correctly support the emission reductions being claimed.

Monitoring methodology description is not well arranged in the PDD /13/ and monitoring plan /14/ regarding JI procedures and requirements at the time of issuance. Current Monitoring report /1//2/, reflect this development in JI procedures as well as requested improvement of Monitoring report. The report develops information about monitoring methodology and emission reduction calculation on good standard as well as information about individual parameters. Only small changes were requested as findings from site visit (see CAR1) and based on this it was improved in second version of the Monitoring report /1//2/.

Maintenance and calibration of individual heat meters or flow meters correspond with standards and provided certificates /3/ cover all monitoring period. The management of metrology is on good level, especially in the light of situation, when all metering devices are owned by customers. However some period of internal schedule was not possible to keep (see CL1) and although marking of measurement devices should be improved (see FAR1).

The details about metering devices are presented in tables below.

All parameters related CET I /5/ was provided by S.C. Electrocentrale Oradea S.A. as official letter. The list of these parameters is included in the monitoring report /1/ and correctly applied in calculation of emission reduction /2/. The description of individual steps of calculation is described in the Monitoring report. This description complements the lack of information in the PDD /13/ and the Monitoring plan /14/.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	Energy supplied from the geothermal heating plant
Measuring frequency:	continuously
Reporting frequency:	Read daily, reported monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Heat meter switching type Supercal 531
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	No, it is not stated in the PDD, but accuracy is in compliance with local legislation and calibration is provided by accredited laboratory /3/. Thus the accuracy represents good monitoring practice.
Calibration frequency /interval:	4 years (6 years according to PDD)



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Is the calibration interval in line with the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration interval is 6 years according to the PDD but 4 year interval is requested by national legislation. The project has been carried out calibrations according to national regulation (4 year interval), which is shorter period.
Company performing the calibration:	SC Fluid Group Hagen SRL Carei
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is(are) calibration(s) valid for the whole reporting period?	The certificate was provided and it covers whole reporting period (dated 15 March 2010) /3/.
If applicable, has the reported data been cross-checked with other available data?	The primary data Parametri PTG /4/ was crosschecked with reported data
How were the values in the monitoring report verified?	The data from monitoring report was crosschecked with Parametri PTG /4/
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, how was described above, the reported data was crosschecked with primary data.
In case project participants have temporarily not monitored the parameter, have adequate and conservative assumptions been applied for missing data?	NA

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	Hot water supplied to consumers from Beius wells
Measuring frequency:	continuously
Reporting frequency:	Read and reported monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Flow meters types WEHRLE ETW, GROUP MTW, ZENNER MTW, AN SPX, SIMENS ULTRAHEAT, MEINECKE WPD, SENSUS WPD, HIDROMETER, MTW Contor group, SPX-AN, POLLU COM
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	No, it is not stated in the PDD, but accuracy is in compliance with local legislation, calibration is provided by accredited laboratory /3/. Thus the accuracy represents good monitoring practice.
Calibration frequency /interval:	4 years (6 years according to PDD)
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of	Calibration interval is 6 years according to the PDD but 4 year interval is requested by national legislation. The project has been carried out



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calibration, does the selected frequency represent good monitoring practise?	calibrations according to national regulation (4 year interval), which is shorter period.
Company performing the calibration:	SC Fluid Group Hagen SRL Carei / BRML Laboratory Oradea and Control group
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	The certificates were checked with the calibration table provide by PP /3/. All certificates were in compliance with requirements.
If applicable, has the reported data been cross-checked with other available data?	The primary data from devices' tables were crosschecked with invoicing data.
How were the values in the monitoring report verified?	The data from monitoring report was crosschecked with primary data /7/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, how was described above, the data was crosschecked with invoices.
In case project participants have temporarily not monitored the parameter, have adequate and conservative assumptions been applied for missing data?	NA

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	Heat supplied to consumers in Beius
Measuring frequency:	continuously
Reporting frequency:	Read and reported monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Heat meter types WEHRLE MTW, SONTEX, ZENNER (calculator), POLLU COM, JUMO, SUPERCAL, AEM LUXTERM, PT 500
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	No, it is not stated in the PDD, but accuracy is in compliance with local legislation, calibration is provided by accredited laboratory /3/. Thus the accuracy represents good monitoring practice.
Calibration frequency /interval:	4 years (6 years according to PDD)



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Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration interval is 6 years according to the PDD but 4 year interval is requested by national legislation. The project has been carried out calibrations according to national regulation (4 year interval), which is shorter period.
Company performing the calibration:	SC Fluid Group Hagen SRL Carei
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	The certificates were checked with the calibration table provided by PP /7/. All of them were in compliance with requirements.
If applicable, has the reported data been cross-checked with other available data?	The primary data from devices' tables were crosschecked with invoicing data.
How were the values in the monitoring report verified?	The data from monitoring report was crosschecked with primary data.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, how it was described above, the data was crosschecked with primary data.
In case project participants have temporarily not monitored the parameter, have adequate and conservative assumptions been applied for missing data?	NA

3.4 Assessment of Data and Calculation of emission reductions

The emission reduction calculation description is well arranged in the Monitoring report /1//2/.

The emission factor for electricity production of 203.67 kgCO₂/GJ is based on the ERUPT 2001 default 2005 Romanian value /18/ for this periods.

The efficiency of 47.62% is assumed for the boilers for heat generation and 13.49% for the electricity production in 2011 period /5/.

The annual average electric efficiency of the CET is obtained annually as well as the annual average thermal plant efficiency. Data for the evaluation of the efficiency were presented during site visit /5/.

The heat energy supplied by the geothermal heating plant and heat energy/hot water supplied to individual consumers in Beius has been measured by calibrated meters /3/. The calibration certificates were available during the site visit and were checked. The status of the measuring equipment was also a topic of the audit carried out by the local EPA. The accuracy of the metering devices is in compliance with the local legislation. As the accuracy level is not stated directly in the PDD, it is sufficient for JI project purpose too.

Used conversion factors and definitions are summarized on top of this report in abbreviation section for better clarity.



The emission reduction for monitoring period is 30 338 tonnes of CO₂ equivalent. The PDD supposed 23 853.55 tonnes of CO₂ equivalent, which is lower value than is real calculation. The higher number follows from unexpected better efficiency of CET I /5/ than estimated in the baseline study and the calculation there on project emissions reduction (i.e. baseline was supposed lower than is in reality).

3.5 Quality of evidence to determine emission reductions

All parameters records as the supplied heat energy /4//7/, input data necessary for the calculations of the emission reductions /5//6/, have been reviewed and approved by the plant manager of the site. The calculation of the emission reductions and the collection of the monitoring data were inspected by the local EPA /8/ too.

The external data for the electricity produced by the other power plants have been provided by the operator of CET I /5/.

The presented data has been evidenced by primary records of monthly reading for individual heat of flow meters /7/, temperature difference for individual wells /12/ and primary records of heat plant /4/.

3.6 Management system and quality assurance

The monitoring and reporting of the heat energy is a part of the standard operation of the Transgex personnel. The expected quality of data is assured by the appropriate and regularly checked meters.

Transgex has implemented and operated the quality management system in accordance with the requirements of the ISO 9001:2000 standard. The monitoring activity as well as the control of all requirements described in the PDD and the Monitoring plan is a subject of the internal audits /9/. The controlling role of the local EPA /8/ is also of importance.

All responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan (DVM §101 d).



4 VERIFICATION STATEMENT

DNV Climate Change AS (DNV) has performed the verification of the emission reductions that have been reported for the “Geothermal Energy in Oradea – area II and Beius in Romania” (UNFCCC Registration Reference No. RO1000081) for the period 1 January 2011 to 31 January 2011.

The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV’s responsibility to express an independent verification statement on the reported GHG emission reductions from the project. DNV does not express any opinion on the selected baseline scenario or on the validated and registered PDD.

DNV conducted the verification on the basis of the monitoring plan contained in the registered Project Design Document of July 2004, version 2.3 and the monitoring report (Version 02) dated 14 September 2012. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

DNV’s verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions of the “Geothermal Energy in Oradea – area II and Beius in Romania” (ITL project ID RO1000081) for the period 1 January 2011 to 31 January 2011 are fairly stated in the monitoring report (Version 02) dated 14 September 2012 and are accurate and free of material errors, omissions, or misstatements.

The GHG emission reductions were calculated correctly on the basis of the monitoring plan contained in the registered PDD of July 2004, version 2.3.

DNV Climate Change AS is able to verify that the emission reductions from the “Geothermal Energy in Oradea – area II and Beius in Romania” during the period 1 January 2011 to 31 January 2011 amount to 30 338 tonnes of CO₂ equivalent.

Prague and Oslo, 16 October 2012

Zuzana Andrtová
JI Verifier
DNV Prague, Czech Republic

Ole A. Flagstad
Approver,
DNV Climate Change AS





5 REFERENCES

5.1.1 Documentation provided by the project participants

- /1/ Grue & Hornstrup Consulting Engineers: *JI Monitoring report Geothermal energy in Oradea – Area II and Beius, Monitoring period 1 January 2011 – 31 December 2011*, version 1 dated 8 February 2012 and version 2 dated 14 September 2012
- /2/ Grue & Hornstrup Consulting Engineers: *120316_Oradea MR 2011.xlsx*, dated 16 March 2012 (previous version dated 8 February 2012)
- /3/ Transgex: *Calibration Tables: Contoare cu filtru JI - Beius 2011.xls and Contoare cu filtru JI - Geoterm 2010.xls and certificates individual flow and heat meters* (details for individual certificates are presented as a tables)
- /4/ Transgex: *Parametri PTG for periods 8 December 2008 till present* – primary records of geothermal heating plant
- /5/ S.C. Electrocentrale Oradea S.A: *Fax Nr. 0259/02.02.2012 with requested data about electrical and thermal energy production at CET Oradea in year 2011* dated 2 February 2012
- /6/ Invoices for natural gas for 2011 (DGV PJ 2161, DGV PJ 7043, DGV PJ 7577) from 31 January 2011, 28 February 2011 and 31 March 2011
- /7/ Primary records of individual heat and flow meters covered 2011 year
- /8/ EPA: Records from semi-annually checking dated 1 July 2011 and 1 February 2012
- /9/ QA/QC checklists from monthly review dated 31 January 2011, 28 February 2011, 30 March 2011, 29 April 2011, 29 May 2011, 30 June 2011, 29 July 2011, 30 August 2011, 29 September 2011, 30 October 2011, 25 November 2011 and 1 January 2012
- /10/ Transgex: Training records dated 3 February 2011 (incl. EPA representative) and 25 November 2011
- /11/ Transgex: Assembly of procedures, version 2 dated 2 February 2011
- /12/ Primary records for well temperature for well 3001 and for well 3003 covered 2011 period

5.1.2 Other project documents or documents used by DNV to verify the information provided by the project participants

- /13/ Grue & Hornstrup Consulting Engineers, *Project Design Document: Geothermal Energy in Oradea - Area II and Beius*, Version 2.3, July 2004 (PDD)
<http://ji.unfccc.int/UserManagement/FileStorage/TVF81O2X3S0JJP7DYZ5CMR4NBU6HLQ>
- /14/ Grue & Hornstrup Consulting Engineers, *Monitoring Plan: Geothermal Energy in Oradea - Area II and Beius*, Version 2.3, July 2004 (MP)
<http://ji.unfccc.int/UserManagement/FileStorage/TVF81O2X3S0JJP7DYZ5CMR4NBU6HLQ>
- /15/ SGS Climate Change Programme, *Validation of Geothermal Energy in Oradea-Area II and Beius, Romania. Unqualified Validation Report*, Project Number: 6853-dk, 24 December 2004 (Determination Report)
- /16/ Det Norske Veritas Certification AS (DNV):
Periodic Verification of Geothermal Energy Project in Oradea Area II and Beius in Romania, Report No.2011-0416, 27 May 2011 (previous verification report)



VERIFICATION REPORT

Periodic Verification of Geothermal Energy Project in Oradea Area II and Beius in Romania, Report No.2010-0663, 17 December 2010

- /17/ Ministry of Environment and Water Management (MEWM), *National procedure for using Joint Implementation (JI) mechanism under Track I (National JI Track I Procedure)* (Romanian JI Track I Procedure)
<http://ji.unfccc.int/UserManagement/FileStorage/AWBVICCKC5KW215L28BETVJZ1YHUN6>
- /18/ Ministry of Economic Affairs of the Netherlands, *Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 2a: Baseline Studies, Monitoring and Reporting - A guide for project developers, Version 2, October 2001* (ERUPT 2001)

5.1.3 Methodologies, tools and other guidance by the JI Supervisory Committee

- /19/ JI Supervisory Committee, Determination and verification manual, version 01 adopted at JISC 19
- /20/ JI Supervisory Committee, Guidance on criteria for baseline setting and monitoring, version 02 adopted at JISC18
- /21/ JI Supervisory Committee, Standard for applying the concept of materiality in verifications, version 01 adopted at JISC 22

5.1.4 Persons interviewed during the verification

- /22/ Mihai Brasoveanu, DEA representative
- /23/ Thomas Bosse, Grue + Hornstrup A/S, consultant
- /24/ Dragan Alexandru, Operation Supervisor
- /25/ Iacobescu Alin, Director of Transgex
- /26/ Heredea Ionut, Transgex representant

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APPENDIX A

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Corrective action requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 1	Monitoring report: Some discrepancy occurred between primary data and excel calculation of MR (Spital Municipal Maternitate, Z1 scB, Z2 scA, Z2 scB, Z3 scA, Oficiul Postal Beius) as well as a high number of temperatures did not correspond with primary data.	The Monitoring Report has been corrected accordingly. Revised Monitoring Report and heat meter reading is provided for cross checking	The updated version of the Monitoring report was found as correct by DNV. The CAR is closed

Clarification requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	Some calibrations were realized later than it was requested according to internal schedule; the legal requirements for calibration of these measurement devices types should be clarified. Also the reaction to problems with metering is relative long – within 3 months. The evidence about status of measurement device after repairing is necessary (calibration is or is not necessary)	A respective statement from Transgex (PP) is provided. During upcoming monitoring training site visits carried out by the technical assistant a special focus will be placed on aspects related to calibrations/re-calibrations in order to ensure that “reaction time” towards eventual problems can be reduced as much as possible in the future.	The Transgex statement provided information, that the assembling and assessing if the individual measurement device is necessary re-calibrate is on Transgex SA as the company is authorized by Romanian Legal Metrology. The focus to reaction time should improve keeping internal calibration plan, however the validity of the calibration certificates are longer than planned internal calibration dates The CL is closed

Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	NA		FAR was closed during previous verification

Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV's assessment of response by Project Participants
FAR 1	Traceability of measurement devices is not on standard level (serial numbers of measurement devices is not visible and the names of several measurement points do not correspond through individual records)	During upcoming monitoring training site visits carried out by the technical assistant a special focus will be placed on aspects related to traceability of measurement devices. Additional efforts will be put on informing the PP to keep serial numbers of measurement devices more visible.	The forward action plan is suitable, the review of progress will be realized during next verification. The FAR remains open.