TÜV Rheinland (China) Ltd.

VERIFICATION REPORT

COGENERATION AND UTILIZATION OF WASTE HEAT AT LLC "LUKOIL ENERGY AND GAS UKRAINE"

ITL Project ID: UA1000301

First Periodic Verification
for the period: 01/07/2010 – 30/11/2012

Report No. 21220906-01
Version 1

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Date of first issue:	Project No.:
31.01.2013	21220906

Organizational Unit

TÜV Rheinland (China) Ltd (TÜV Rheinland)
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Client:	
RWE Power AG	

Summary:
TÜV Rheinland (China) Ltd (the verifier) has performed the verification of emission reductions for the JI Track 1 project "Cogeneration and Utilization of waste heat at LLC "LukOil Energy and Gas Ukraine" (ITL Project ID UA1000301) for the first monitoring period from 01/07/2010 to 30/11/2012.

The purpose of verification is to assess the Greenhouse gas (GHG) emission reductions generated by a JI project and reported by the project participants through the monitoring report in accordance with paragraph 37 of the JI guidelines.

On the opinion of verifier, the greenhouse gas (GHG) emission reductions reported for the project in the monitoring report (Version 1.3) dated 24/01/2013 are fairly stated and are accurate and free of material errors, omissions, or misstatements. During the monitoring period the project has been implemented in accordance with the approved Project Design Document Version 2.4 dated 09/06/2011. The GHG emission reductions were calculated correctly by project proponent on the basis of the approved monitoring plan contained in the Project Design Document Version 2.4 dated 09/06/2011.

TÜV Rheinland (China) Ltd is able to verify with the reasonable, but not absolute, level of assurance, the indicated below amount of emissions reductions achieved by the JI project activity "Cogeneration and Utilization of waste heat at LLC "LukOil Energy and Gas Ukraine" during the period 01/07/2010 to 30/11/2012:

Time Period	**Emission reductions achieved, in tCO_{2e}**
1.07.2010-31.12.2010	19 233
1.01.2011-31.12.2011	13 958
1.01.2012-30.11.2012	42 621

Thus, total amount of emissions reduction achieved due to project implementation during the first monitoring period equals to 75,812 tonnes of CO_{2e}

Report No.:	Subject
21220906-01	JI Track 1

Report title:
COGENERATION AND UTILIZATION OF WASTE HEAT AT LLC "LUKOIL ENERGY AND GAS UKRAINE"

Work carried out by:

Mr. Yuriy Lozynskyy
Team Leader

Work Verified by:

You Cui
Technical Reviewer

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Indexing terms

Kyoto Protocol
Verification
Joint Implementation

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Abbreviations

AF	Adjustment Factor
AM	Approved Methodology
ACM	Approved Consolidated Methodology
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emissions reduction
CHP	Combined Heat and Power Generation
CL	Clarification Request
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DFP	Designated Focal Point
DOE	Designated Operational Entity
DR	Document Review
EA	Economic Analysis
EB	Executive Board
EIA	Environmental Impact Assessment
ER	Emissions reduction
ERPA	Emissions reduction Purchase Agreement
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse Gas
GWh	Giga Watt Hours
GWP	Global Warming Potential
I	Interview
IETA	International Emissions Trading Organisation
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
IVC	Initial Verification Checklist
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
kW	Kilo Watt
kWh	Kilo Watt Hours
LoA	Letter of Approval
LoI	Letter of Intent
LFGTE	Landfill Gas to Energy
LSTHC	Local Stakeholder Consultation
MoV	Means of Verification
MW	Mega Watt
MWh	Mega Watt Hours
NGO	Non Government Organisation
NPV	Net Present Value
ODA	Official Development Assistance
OSV	On Site Visit
PDD	Project Design Document
PP	Project Proponent
PVC	Periodic Verification Checklist
QC	Quality Control
QA	Quality Assurance
SItC	Supplier Information to Client
t	Tonne

UNFCCC	United Nations Framework Convention on Climate Change
VC	Verification Checklist
VP	Verification Protocol
VVM	Validation and Verification Manual

Table of Contents Page

1 INTRODUCTION

RWE Power AG has contracted TÜV Rheinland (China) Ltd (hereafter "the verifier") to carry out the verification of JI Track 1 project "Cogeneration and Utilization of waste heat at LLC "LukOil Energy and Gas Ukraine" (hereafter "the project") for the time period from 01/07/2010 till 30/11/2012 (first monitoring period). Verification is the periodic independent review and ex post determination by the verifier of the monitored reductions in GHG emissions during the defined verification period. This report contains the findings from the verification and conclusion on the verified amount of emission reductions (verification opinion).

1.1 Objectives

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

The purpose of verification is to assess the reductions in anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks generated by a JI project and reported by the project participants through the monitoring report in accordance with paragraph 37 of the JI guidelines.

The objective of this periodic verification is to verify that the procedures and methodologies used in the given JI Project were correct implemented for the GHG emissions reduction calculation. The objective of the verification is also to express a conclusion with a high, but not absolute, level of assurance about whether the reported GHG emissions reduction data is free of material misstatements; and to verify that the reported GHG emissions data is sufficiently supported by the evidences, i.e. monitoring records.

Each task of the verification process comprised a desk review of the project documents including the project description, monitoring plan, determination report, monitoring report, documents on the amount of electricity and heat supplied and on the amount of fuels consumed by the cogeneration and other material documentation corresponding to the cogeneration unit installed, as listed in the Section "References" in this report.

1.2 Scope

Verification scope is defined as an independent and objective review and ex post determination by a verifier of the monitored reduction in GHG emissions.

The scope of this verification is the assessment of:

- Project implementation in accordance with the Project Design Document (PDD);

- Compliance with the monitoring plan, including the revision of the monitoring plan;
- Calculation of emission reductions and expression of a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data are accurate and free of material errors, omissions, or misstatements;
- Quality and management of data and verification that reported GHG emission reductions data is sufficiently supported by evidence.

The verification is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for the improvement of the project design.

1.3 Description of the Project Activity

Project Parties involved:	Ukraine (Host country) and Germany (Guest country)
Title of the project:	Cogeneration and Utilization of waste heat at LLC ”LukOil Energy and Gas Ukraine”
ITL Project ID:	UA1000301
Baseline and monitoring methodology:	JI Specific Approach based on PDD ver.2.4 dated 09/06/2011
Project entity participant:	LLC „LukOil Energy and Gas Ukraine“ Shkodova Gora st. 1/1 Odessa 65041 Ukraine
Other project participants:	RWE Power Aktiengesellschaft Huyssenallee 2 45128 Essen Germany
Location of the project:	Premises of the cogeneration plan of ”LukOil Energy and Gas Ukraine” Shkodova Gora st. 1/1 Odessa 65041 Ukraine
Crediting period of the project:	01/07/2010-31/12/2012
Period verified in this report:	01/07/2010-30/11/2012

The purpose of the project is the increase of the organic fuel use efficiency through combined heat and power generation based mainly on the visbroken atmospheric residue (VAR) combustion, accompanied by greenhouse gases emission reductions. Project is realized by LLC “Lukoil Energy and Gas Ukraine” (LEGU) to improve the reliability of heat energy supply to the nearby JSC “Lukoil-Odesskyy Oil-Refining Plant” (LOORP). During the implementation of the cogeneration unit (diesel engine power plant with 2 exhaust-boilers) with total electricity capacity of 17.8 MW and total heat energy capacity of 176.6 GJ per hour has been constructed.

The cogeneration unit for combined heat and power generation with visbroken atmospheric residue, diesel fuel and natural gas combustion is installed instead of boilers, which combust organic fuel and generate heat power. The unit consists of the diesel engine power plant equipment, two exhaust-boilers and outgoing gases purification system.

Generated electricity is supplied to the national grid to substitute electricity generated by power plants, but could also be used for covering electricity supply of LOORP. Generated heat energy is used for covering the heat energy demand of the LOORP.

The project uses the state-of-the-art technologies, which result in a significantly better performance than commonly used technologies in Ukraine (natural gas fired boilers for heat generation and generation of electricity by power stations of national grid).

The project has been registered as Track 1 JI project with the PDD ver.2.4 dated 09/06/2011 (the PDD). The documentation on the project including the PDD, Approvals by the Parties Involved, Determination Report is available at: http://www.carbonunitsregistry.gov.ua/en/publication/content/977.htm.

1.4 Methodology for the determination of Emission Reductions

The baseline scenario has been established in accordance with Appendix B of the JI Guidelines and in accordance with "Guidance on Criteria for Baseline Setting and Monitoring" Version 02 by the JISC.

The emission reductions are calculated as the difference between baseline emissions and project emissions. Baseline scenario has been established on a project specific basis and using multi-project emission factor for electricity generated by power plants of the national grid. The project specific approach was used to estimate baseline emissions from heat energy generation. Thus, baseline scenario foresees further exploitation of the existing boilers with their graduate replacement with the new boilers utilizing residual fuel oil, refinery and natural gas as the main fuels and no on site electricity generation. Greenhouse gases emissions sources in baseline scenario include the following:

- Heat power generation by boilers with residual fuel oil, natural and refinery gas combustion in the amount that will be supplied by the cogeneration unit within the project activity;

- Electricity generation by fossil fuels power plants of the national grid in the amount that will be supplied by the cogeneration unit within the project activity.

JI specific approach with elements of the approved baseline and monitoring methodology AM0014 "Natural gas-based package cogeneration" (Version 04) was chosen for monitoring of greenhouse emission reductions. Monitoring plan was established in accordance with Host Party regulations, namely in accordance with Decree of Cabinet of Ministers of Ukraine #206 dated

22.02.2006 „On Approval of the Procedure of Drafting, Review, Approval and Implementation of Projects Aimed at Reduction of Anthropogenic Emissions of Greenhouse Gases“ and “Requirements for the Joint Implementation Projects preparation” approved by National Environmental Investment Agency of Ukraine (Order #33 from 25th of June, 2008).

Monitoring plan has also been established in accordance with Appendix B of the JI guidelines and taking into account Guidance on criteria for baseline setting and monitoring developed by JISC. The formulae applied correspond mainly to those proposed by the approved baseline and monitoring methodology AM0014 “Natural gas-based package cogeneration” (Version 04) and Tool to calculate project or leakage CO_2 emissions from fossil fuels combustion” (Version 02).

Greenhouse gases emissions sources in project scenario within the defined project boundaries include emissions due to organic fuel combustion by the cogeneration unit. Formulas according to the „Tool to calculate project or leakage CO_2 emissions from fossil fuels combustion” Version 02 were used for project emissions calculations. The source of project greenhouse gases emissions as defined in PDD were combustion of organic fuel (visbroken atmospheric residue), diesel and natural gas; RFO and refinery gas were also foreseen as reserve fuels in cogeneration unit.

2 METHODOLOGY

The verification process has been carried out using TÜV Rheinland internal procedures. In order to ensure transparency, a check-list for verification was customized for the project, according to the Joint Implementation Determination and Verification Manual Version 01, issued by the Joint Implementation Supervisory Committee at its 19th meeting on 04/12/2009. The check-list for verification (Appendix A to this report) shows, in a transparent manner, criteria (requirements) for verification and the results from verifying the identified criteria. The check-list for verification serves the following purposes:

- It organizes details and clarifies the requirements a JI project is expected to meet;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been verified and the result of the verification.

The completed check-list for verification is enclosed in Appendix A to this report.
The verification process (steps) taken include: desk review of the documentation, project site visit, interviews with project participants, follow-up exchanges and resolution of outstanding issues.

2.1 Verification team

JI Auditor:	Mr. Yuriy Lozynskyy, TÜV Rheinland
Technical Reviewer:	Mr. You Cui, TÜV Rheinland

Full name	Country	Role	Desc Review	Site Visit	Reporting	Supervision	Technical Reviewer	Expert Input
Mr. Yuriy Lozynskyy	Germany	Team Leader/JI Verifier	X	X	X	X		X
You Cui	Germany	Technical Reviewer					X	

2.2 Review of Documentation

Project participants provided TÜV Rheinland (the verifier) all needs document for document review. The monitoring report version 1.3 dated 24/01/2013 /6/ and its previous versions have been assessed as part of the verification. In addition, the project's Project Design Document /1/ and project's determination report /2/ were also reviewed. Supporting documents, such as monthly reports on the results of GHG monitoring for the project /33/, set of certificates on the amount and type of fuel consumed by the cogeneration unit, certificates on calibration of monitoring equipment and other documents, as specified in the "References" section of the report were also available during the verification process to the verifier.

Information and formulas provided in the monitoring report were compared with PDD and stated data sources. To address TÜV Rheinland corrective action and clarification requests, project participants revised the original monitoring report for the project and resubmitted the final version as version 1.3 dated 24/01/2013. The verification findings thus presented in this report relate to the latest monitoring report version 1.3 and project as described in the approved PDD ver.2.4 dated 09th of June 2011.

2.3 On-Site Visit

The cogeneration unit of the LLC "Lukoil Energy and Gas Ukraine" has been visited on the 5th of November 2012 by the TÜV Rheinland Verification Team by JI Lead auditor Mr. Yuriy Lozynskyy. Supporting documents related to the project were presented and inspected at the administrative office of LLC "Lukoil Energy and Gas Ukraine" in Odessa, Ukraine on that date. During this site visit, the verifier has interviewed key personnel of the plant and verified that during the monitoring period project has been operating as planned.

The personnel interviewed are summarized in the table below:

No.	Name and Position	Organization	Topic
1	Mr.Tomlyak, K.A., Director Ms. Levyk, K.D. Consultant	LLC "KT-Energy"	Reporting and calculation of emission reductions, data sources QA/QC of the project, Project management, Project implementation, Personnel training
2	Melnikov D.V. Chief Engineer Grekov E.S. Chief Technology Engineer Prokopenko M.A. Environmental protection engineer Medvedev D.S. Chief of Industry Safety and Ecology Group	LLC "Lukoil Energy and Gas Ukraine"	Operational reporting, logbooks, Operation of monitoring equipment QA/QC of the project, Project management, Personnel training Calibration of monitoring equipment Collection of Monitoring data Data management system and data collection procedures

2.4. Resolution of Clarification, Corrective and Forward Action Requests

Where TÜV Rheinland in assessing the monitoring report and supporting documents has identified issues that need to be corrected, clarified or improved with regard to the monitoring requirements, it has raised these issues and informed the project participants of these issues in the form of:

- Corrective Action Request (CAR) - issued where

a) Mistake have been made in assumptions, application of the methodology and/or methodological tools or in the project documentation which has had directly influenced project results.

b) The JI-specific requirements deemed relevant for verification of a project with certain characteristics have not been met;

c) There is a risk that emissions reduction cannot be verified and certified.

- A Clarification Request (CL) - have been issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met
- A Forward Action Request (FAR) has been raised in the context of verification where the certain issues related to project implementation should be reviewed during the next verification.

The verification of the project resulted in 12 Corrective Action Requests and 2 Clarification Requests. There was no unresolved FARs from validation process.

The initial finding of the Verification Team, resolution of any CARs, CLs and FARs raised and review of such resolution is provided in the Appendixes A and B to this report.

3. VERIFICATION FINDINGS

3.1. Remaining FARs from Previous Validation/Verification(s)

Not applicable as there were no remaining issues in the form of FARs from validation process. Since it is the first verification in the lifetime of the project, there are no FARs issued during previous verification(s).

3.2. Project Implementation

Cogeneration unit's diesel engine power plant equipment was installed in September 2008 and exhaust boilers were installed in April, 2010. Cogeneration unit of the project was accepted to operation by the Act of the working commission on the acceptance in operation of the finished of power unit at LLC "Lukoil Energy and Gas Ukraine" dated 18.06.2010. The operation of cogeneration unit started on 01.07.2010, which can be confirmed via interviews held by DOE with Chief engineer Mr. Melnikov D.V. and Environmental protection engineer Ms. Prokopenko M.A. during on-site visit and analysis of supporting information in the form of monthly reports on the results of GHG monitoring for the "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" JI project /33/.

The total emission reductions amount reported for the monitoring period 01/07/2010-30/11/2012 were verified to be equal to 75,812 tCO_{2e}. The emission reductions achieved by the project activity are lower than that the emission reduction of 78,294 tCO_{2e} emission reductions annually predicted in the registered PDD. The reason for this can be that the cogeneration unit was not properly functioning in May 2011- September 2011 due to the breaks in operation of its main energy consumer Lukoil oil refinery.

The verifiers can confirm through the visual inspection, document check and interviews held that all physical features of the proposed JI project activity including data collecting and storage systems have been implemented, the project is completely operational and has been implemented as described in the approved PDD /1/.

3.3. Project Approval by Parties Involved

The project has been approved by the DFPs of the Parties (Host country – Ukraine, Guest Country- Federal Republic of Germany). Appropriate LoA from Guest and Host country were submitted to the verifier and are appropriate. The project is registered as JI project by the DFP of Ukraine (evidence is available at http://www.carbonunitsregistry.gov.ua/en/publication/content/977.htm) and by the Federal Republic of Germany (evidence is available at https://www.jicdm.dehst.de/promechg/pages/project1.aspx).

3.4. Calculation of emission reductions

Calculation of emission reductions was made by PP in accordance with the calculation procedures and monitoring plan as set in approved PDD /1/ in correct and transparent manner. This can be confirmed by the verification team after inspection of ERUs calculation sheet /55/ and the content of Monitoring Report /6/ for the project. Emission reductions were calculated as the difference between the baseline emissions for the project and the project emissions for each calendar year.

Baseline emissions

Baseline emissions were calculated by PP as the sum of baseline emissions due to heat energy supply by the boilers operated on the residual fuel oil, natural and refinery gas under the baseline scenario in the amount which was substituted with heat energy supplied by the cogeneration unit under the project scenario and baseline emissions due to electricity generation by power plants of the national grid under the baseline scenario in the amount which was substituted with electricity supplied by the cogeneration unit under the project scenario. For more detailed information related to calculation procedures please refer to the registered PDD version 2.4./1/.

All parameters used for the estimation of baseline emissions were verified by the verification team to be correctly supported by evidences reviewed as follows:

1) Electricity supplied from the cogeneration unit to the national grid - the data used for the ERUs calculation was verified to be based on the printouts on the electricity supply by cogeneration unit to the grid /25/ and on monthly reports on the results of GHG monitoring /33/ in accordance with Monitoring Plan for the project as specified in the PDD

2) Annual heat output from the cogeneration unit that is supplied to the consumer - the data used for the ERUs calculation was verified to be based on acceptance acts on the heat energy supply /35/ and on monthly reports on the results of GHG monitoring /33/ in accordance with Monitoring Plan for the project as specified in the PDD

3) Weighted emission factor for baseline fuel mix - the value applied for ERU calculation was verified to correspond to the fixed wweighted emission factor which was calculated on a basis of historical data on fuels consumption for heat energy generation by boilers at Lukoil-Odessa refinery which was fixed ex-ante in project PDD /1/

4) Emission factor for electricity of Ukrainian grid for projects producing electricity to the grid – this values was monitored and the value for each year was verified as being correctly used based on the Orders of of National Environmental Investment Agency of Ukraine /16/,/17/

5) Average efficiency of residual fuel oil/gas fired boilers under the baseline scenario – this value was fixed ex-ante and is verified as used correctly and equals to 90% as specified in the approved PDD /1/

Project emissions

Project emissions were defined as the sum of project emissions due to natural gas, Visbroken Atmospheric Residue (VAR), diesel fuel, residual fuel oil and refinery gas consumption by the cogeneration unit. For more detailed information related to calculation procedures of project emissions please refer to the registered PDD version 2.4 /1/.

All parameters used for the estimation of baseline emissions were verified by the verification team to be correctly applied and supported by evidences reviewed as follows:

For project emissions related to natural gas consumption by cogeneration unit:

1) Quantity of natural gas used for combined heat and power generation by the cogeneration unit - the data used for the ERUs calculation was verified to be based on Set of monthly reports created by the ConCor 5.27 programme on the quantity of natural gas consumed by the LLC “Lukoil Energy and Gas Ukraine” /36/ and on monthly reports on the results of GHG monitoring /33/ in line with Monitoring Plan for the project as specified in the PDD.
2) Net calorific value of natural gas - the data used for the ERUs calculation was verified to be based on monthly certificates on the physical-chemical parameters of the natural gas /31/ in accordance with Monitoring Plan for the project as specified in the PDD.
3) Emission factor for natural gas - the data used for the ERUs calculation was verified to be fixed ex-ante in PDD and based on Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories /9/

For project emissions related to VAR consumption by cogeneration unit:

1) Quantity of VAR used for combined heat and power generation by the cogeneration unit - the data used for the ERUs calculation was verified to be based on the set of certificates on the transfer of VAR /34/ and on monthly reports on the results of GHG monitoring /33/ in accordance with Monitoring Plan for the project as specified in the PDD.

2) Net calorific value of VAR- the data used for the ERUs calculation was verified to be based on certificates of Central Plant Laboratory of LLC "Lukoil Energy and Gas Ukraine" on the component content of VAR /32/ in accordance with PDD for the project

3) Emission factor for VAR - the data used for the ERUs calculation was verified to be revised by PP in comparison to PDD and is verified to be based on the basis of actual data on carbon content of VAR that is used as a fuel in the project equipment. Data on the carbon content of VAR is used according to the Technical conditions TY Y 23.2-00152282-004:2009 on visbreaking residue dated 9th of April, 2009 /19/

For project emissions related to diesel fuel consumption by cogeneration unit:

1) Quantity of diesel fuel used for combined heat and power generation by the cogeneration unit - the data used for the ERUs calculation was verified to be based on certificates on the balance of diesel fuel /26/ and on monthly reports on the results of GHG monitoring /33/ in accordance with Monitoring Plan for the project as specified in the PDD.
2) Net calorific value of diesel fuel - the data used for the ERUs calculation was verified to be based on the source Kolchin, A.I., Demidov, V.P. (1980) Calculation of auto and tractor engines /29/
3) Emission factor for diesel fuel - the data used for the ERUs calculation was verified to be fixed ex-ante in PDD and based on Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories /9/

For project emissions related to residual fuel oil consumption by cogeneration unit:

1) Quantity of residual fuel oil used for combined heat and power generation by the cogeneration unit - the data used for the ERUs calculation was verified to be based on certificates on the supply of residual fuel oil from suppliers /27/, truck/liquid unloading timesheets for the residual fuel oil /28/ and on monthly reports on the results of GHG monitoring /33/ in accordance with Monitoring Plan for the project as specified in the PDD.
2) Net calorific value of residual fuel oil - the data used for the ERUs calculation was verified to be based on passports on the quality of residual fuel oil supplied issued by suppliers/30/ in accordance with Monitoring Plan for the project as specified in the PDD.
3) Emission factor for residual fuel oil - the data used for the ERUs calculation was verified to be fixed ex-ante in PDD and based on Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories /9/

For project emissions related to refinery gas consumption by cogeneration unit:

1) Quantity of refinery gas used for combined heat and power generation by the cogeneration unit - the data used for the ERUs calculation was verified to be based on certificates on the balance of refinery gas /37/ and on monthly reports on the results of GHG monitoring /33/ in accordance with Monitoring Plan for the project as specified in the PDD.

2) Net calorific value of refinery gas - the data used for the ERUs calculation was verified to be based on certificates of Central Plant Laboratory of LLC "Lukoil Energy and Gas Ukraine" on the component composition of refinery gas /23/ in accordance with PDD for the project

3) Emission factor for refinery gas - the data used for the ERUs calculation was verified to be revised by PP in comparison to PDD and is verified to be based on the basis of actual data on carbon content of refinery gas that is used as a fuel in the project equipment. Data on the carbon content is collected according to the passports on the refinery gas /23/.

The monitoring of emission reductions achieved by the JI project is made in general in accordance with the monitoring plan contained in the registered PDD /1/. However there were several changes made to the sources for monitoring parameters which were used for the calculation of emission reduction. These changes made were described in full by PP in the Section A.6 "Deviations and/or revisions of the Monitoring Plan" of the Monitoring report /6/ as follows:

1) The value for the Emission factor for electricity of Ukrainian grid for projects producing electricity to the grid for the year 2012 was set based on the Order #75 from 12th of May, 2011 of National Environmental Investment Agency of Ukraine „On the Approval of Specific Parameters of Carbon Dioxide Emissions in 2011"/17/. The value of carbon dioxide emissions factor for generation of electricity by thermal power plants of united energy system of Ukraine for the year 2011 was used for calculation of emissions reduction in 2012, since there was no approved carbon dioxide emissions factor for generation of electricity by thermal power plants of united energy system of Ukraine for the year 2012.
   On the verifier's opinion, this deviation is acceptable in the view of the missing approved values for electricity factor for the year 2012 by the end of the verification phase. The application of electricity factor of the year 2011 for the calculation of baseline emissions for 2012 does not lead to material deviations in the calculation of emission reductions.

2) Emission factor for refinery gas - the data used for the ERUs calculation was verified to be revised by PP in comparison to PDD and is verified to be based on the basis of actual data on carbon content of refinery gas that is used as a fuel in the project equipment. Data on the carbon content is collected according to the passports on the refinery gas /23/.
   The deviation in the estimation of emission factor for refinery gas was caused by the attempt to improve accuracy of the estimation of emission reductions. Given that the calculation of emission factor for refinery gas is based on the actual data on carbon content of refinery gas that is used as a fuel in the projects cogeneration unit and that it leads to increase in the accuracy in the estimation of project emissions, the verifier accept this deviation.

3) Emission factor for VAR - the data used for the ERUs calculation was verified to be revised by PP in comparison to PDD and is verified to be based on the basis of actual data on carbon content of visbroken atmospheric residue that is used as a fuel in the project equipment. Data on the carbon content of VAR is used according to the Technical conditions TY Y 23.2-00152282-004:2009 on visbreaking residue dated 9th of April,

2009 /19/. Given that the calculation of emission factor for VAR is based on the actual data on carbon content of VAR that is used as a fuel in the projects cogeneration unit and that it delivers more accurate results in the estimation of Emission factor for VAR in comparison to the IPCCC value and thus increase the accuracy in the estimation of project emissions, the verifier accept this deviation.

On the opinion of verifier, the calculation of emission reductions is done based on correct values and conservative assumptions in a transparent manner. The initial finding of the Verification Team, resolution of any CARs, CLs and FARs raised and review of such resolution is provided in the Appendixes A and B to this report.

3.5 Data Management and Quality

Data collection procedure is carried out in accordance with the monitoring plan, including the quality control and quality assurance procedures and has been checked by the Verification Team on-site. The data collection and management system for the project is in accordance with the monitoring plan as described in the registered PDD /1/ and Monitoring report /6/. Roles and responsibilities of the technical staff in the framework of the monitoring are correctly described in the monitoring report /6/. The responsibilities and authorities are described for each individual in established internal procedure "Monitoring Procedure for the monitoring of GHG emission reduction at LLC "Lukoil Energy and Gas Ukraine" # P-1.5-09-2012 /22/. Persons working at sites are aware of their responsibilities, and relative records are maintained in accordance with Internal Procedure /22/, what is confirmed by the verifier during on-site visit.

Equipment for the collection of monitoring data is established on-site and is operational, which has been confirmed by the verifier during the on-site visit of the project. Calibration of the monitoring equipment is made in accordance with the monitoring plan in PDD /1/, equipment manufacture specifications and the relevant Ukrainian legislation. All calibration events are listed in Monitoring report /6/ in Section B.4 and were checked by the verifier against the appropriate documentation, such as calibration passports and calibration certificates, as listed in "References" Section and no material mistakes were discovered. It has been verified that the calibration did occur at the correct calibration intervals for all metering devices, and all calibration equipment possess valid calibration passports and certificates.

The evidences and records used for the monitoring are maintained in a traceable manner. Verification Team has got access to all necessary data on monitoring system and emission reductions and received necessary evidence on site.

Monitoring data is recorded at the frequency in line with PDD, data on fuel consumption and heat and electricity supply is permanently recorded and saved by electronic programmes. This can be confirmed by the verifier during on-site inspection and interviews held as specified in section 2.3 of this report. Besides, the monitoring data is saved in the form of monthly monitoring reports /33/ as due to the Internal Monitoring Procedure /22/. Monitoring data on net calorific value of fuels used are collected monthly according to the Certificates of quality of

fuels, which are provided by fuel suppliers. Thus, double archiving of all monitoring data is provided. The data is stored separately in two locations – in Kiev at the office of LLC "KT-Energy" and at the office of LLC "Lukoil Energy and Gas Ukraine" in Odessa. Monitoring data will be stored for two more years after the last transfer of ERUs, which is confirmed by the verifier during the interviews held on-site as specified in section 2.3 of this report.

During the interviews held on-site with members of JI monitoring team, as specified in the section 2.3 of this report, the verifier found that all team members are properly trained and possess necessary experience for the collection and analysis of project monitoring data. Relevant education has been provided by LLC "Lukoil Energy and Gas Ukraine" via internal trainings, equipment producers and specialized organizations.

3.6. Environmental impacts of the project

During the on-site visit observations and interviews held as specified in section 2.3. of this report, the verifier has found that gases emitted from the cogeneration system are monitored and reported in compliance with the requirements of the State environmental monitoring service of the Committee on natural resources in Odessa oblast through official quarterly statistical form 2-tp (air) Data on protection of atmospheric air, which contains information on amounts of trapped and neutralized atmospheric pollutants, itemized emissions of specific pollutants, number of emission sources, measures on reduction of emissions into the atmosphere, emissions from particular groups of pollution sources. The forms 2-tp (air) Data on protection of atmospheric air has being archived at the Enterprise. No harmful effects of the JI project activity on the environment has been identified by the verification team.

4 VERIFICATION STATEMENT

TÜV Rheinland (China) Ltd. as the verifier has performed the verification of the emission reductions that have been reported for JI Track 1 project "Cogeneration and Utilization of waste heat at LLC "Lukoil Energy and Gas Ukraine" (ITL Project ID UA1000301) for the First Periodic Verification period from 01/07/2010 to 30/11/2012.

TÜV Rheinland (China) Ltd. has conducted the verification on the basis of the monitoring plan contained in the registered Project Design Document Version 2.4 dated 09/06/2011 and the Monitoring Report Version 1.3 dated 24/01/2013.

The verification included the assessment of:

- Project implementation in accordance with the Project Design Document (PDD);
- Project compliance with the monitoring plan;
- Calculation of emission reductions and expression of a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data are accurate and free of material errors, omissions, or misstatements;

- Quality control procedures and management of monitoring data and verification that reported GHG emission reductions data is sufficiently supported by evidence.

On the opinion of the verifier, the project has been carried out with the success until the end date of the first monitoring period. Based on the information obtained during the on-site assessment, the installed equipment essential for the measuring of monitored parameters is in good operating conditions. The monitoring system is in place and the project generates emissions reduction.

On the opinion of the verification team the GHG emissions reductions of "Cogeneration and Utilization of waste heat at LLC "Lukoil Energy and Gas Ukraine" JI project for the first monitoring period from 01/07/2010 to 30/11/2012 are fairly stated, accurate and are 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 Project Design Document Version 2.4 dated 09/06/2011. Based on the information which the verifier has seen and evaluated, it can be confirmed, making conservative assumptions and with the reasonable, but not absolute, level of assurance, the indicated below reductions (75,812 tonnes of CO_2 equivalent) amount of emissions achieved by the project activity during the period of the first periodic verification for the JI project "Cogeneration and Utilization of waste heat at LLC "Lukoil Energy and Gas Ukraine":

Time Period	**Emission reductions achieved, in tCO_{2e}**
1.07.2010-31.12.2010	19,233
1.01.2011-31.12.2011	13,958
1.01.2012-30.11.2012	42,621
Total for the period 01.07.2010-30.11.2012	**75,812**

Cologne, 31/01/2013

Yuriy Lozynskyy
Team Leader

References

1.	PDD for the JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" Version 2.4. dated 09/06/2011
2.	Determination Report for the JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" Version 1 dated 05/07/2011 (REPORT NO. 21215058-1-DR)
3.	Monitoring Report for the first verification period of JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" Version 1.0 dated 09/10/2012
4.	Monitoring Report for the first verification period of JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" Version 1.1 dated 12/11/2012
5.	Monitoring Report for the first verification period of JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" Version 1.2 dated 17/12/2012
6.	Monitoring Report for the first verification period of JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" Version 1.3 dated 24/01/2013
7.	UNFCCC methodology AM0014 "Natural gas-based packaged cogeneration" Version 04.
8.	UNFCCC "Tool to calculate project or leakage CO_2 emissions from fossil fuels combustion" (Version 02)".
9.	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, Module 1: Energy
10.	Operational tests of the boilers indicated in parameter charts of the boiler installed at JSC „Lukoil-Odessa oil refining plant"
11.	JISC, Joint Implementation Determination and Verification Manual, Version 01.
12.	JISC, Guidance on Criteria for Baseline Setting and Monitoring, Version 03.
13.	Ministry of environmental protection of Ukraine. Oder Nr. 324 "On approval of requirements to preparation of the joint implementation projects", dated 17/07/2006
14.	Decree of Cabinet of Ministers of Ukraine #206 dated 22/02/2006 „On Approval of the Procedure of Drafting, Review, Approval and Implementation of Projects Aimed at Reduction of Anthropogenic Emissions of Greenhouse Gases"
15.	Order of National Environmental Investment Agency of Ukraine "Requirements for the Joint Implementation Projects preparation" #33 dated 25/06/2008.
16.	Order #43 from 28/03/2011 of National Environmental Investment Agency of Ukraine „On the Approval of Specific Parameters of Carbon Dioxide Emissions in 2010"
17.	Order #75 from 12/05/2011 of National Environmental Investment Agency of Ukraine „On the Approval of Specific Parameters of Carbon Dioxide Emissions in 2011" .
18.	Order #39 from 21/03/2011 „On the Approval of the Methodology of Estimation of Specific Carbon Dioxide Emissions from Electricity Generation on Thermal Power Plants and its Consumption"
19.	Technical conditions TY Y 23.2-00152282-004:2009 on visbreaking residue dated 09/04/2009.

20.	State Environmental Investment Agency of Ukraine: Letter of Approval #2794/23/7 dated 27/09/2011 for JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine"
21.	Deutsche Emissionshandelstelle (DEHST) Letter of Approval for JI project "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" dated 26/10/2011
22.	Monitoring Procedure for the monitoring of GHG emission reduction at LLC "Lukoil Energy and Gas Ukraine" # P-1.5-09-2012
23.	Set of certificates of Central Plant Laboratory of LLC "Lukoil Energy and Gas Ukraine" on the component composition of refinery gas for July 2010-October 2010.
24.	Methodology for estimation of polluting substances emission into the atmosphere from energy units (ГКД 34.02.305—2002)
25.	Set of printouts on the electricity supply by cogeneration unit to the grid for July 2010-November 2012 issued by LLC "Lukoil Energy and Gas Ukraine"
26.	Set of certificates on the balance of diesel fuel for the period July 2010-November 2012 issued by LLC "Lukoil Energy and Gas Ukraine"
27.	Set of certificates on the supply of residual fuel oil for the period July 2010-November 2012 from LLC "Bud-Eco" to LLC "Lukoil Energy and Gas Ukraine"
28.	Set of truck/liquid unloading timesheets for the residual fuel oil for the period July 2010-November 2012 used by LLC "Lukoil Energy and Gas Ukraine" issued by LLC "Lukoil Energy and Gas Ukraine"
29.	Kolchin, A.I., Demidov, V.P. (1980) Calculation of auto and tractor engines. Net calorific value of diesel fuel. Text edition for universities. 2nd Edition.
30.	Set of passports on the quality of residuel fuel oil supplied to the LLC "Lukoil Energy and Gas Ukraine" issued by suppliers "Eksimnaftoprodukt", "Technopromservice-Oil", "Naftek", "Ukrtatnafta","Print Engineering", "KremOil – Sysntez", "Artemida", "Krym-Konkord", "YuniOil" for the period July 2010-November 2012.
31.	Set of monthly certificates on the physical-chemical parameters of the natural gas in natural gas pipeline "SHDKPI" issued by LVUMG of Odessa for the period July 2010-November 2012.
32.	Set of certificates of Central Plant Laboratory of LLC "Lukoil Energy and Gas Ukraine" on the component content of VAR for July 2010-October 2010.
33.	Set of the monthly reports on the results of GHG monitoring for the "Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" JI project issued by LLC "Lukoil Energy and Gas Ukraine" (by Engineer of environmental protection)
34.	Set of certificates on the transfer of VAR from Lukoil oil refinery plant to LLC "Lukoil Energy and Gas Ukraine" for the period July 2010-November 2012
35.	Set of acceptance acts on the heat energy supply from to LLC "Lukoil Energy and Gas Ukraine" to the Lukoil oil refinery plant for the period July 2010-November 2012
36.	Set of monthly reports created by the ConCor 5.27 programme on the quantity of natural gas consumed by the LLC "Lukoil Energy and Gas Ukraine" for the period July 2010-November 2012
37.	Set of certificates on the balance of refinery gas used for the period July 2010-November 2012 by LLC "Lukoil Energy and Gas Ukraine"
38.	Calibration Certificate # 24-1-1/451 on Visbroken Atmospheric Residue meter Promass 80, #D1066E02000 DN 40 dated 16/07/2010

39.	Calibration Certificate # 549-MX on Vertical steel tank PBC-100 #3 dated 08/04/2010
40.	Calibration Certificate # 179-td on steam flow meter PPS.1-OVK-PP.1 #11.09.1112 dated 27/05/2010
41.	Calibration Certificate # 180-td on steam flow meter PPS.1-OVK-PP.1 #11.09.1110 dated 27/05/2010
42.	Calibration Certificate # 178-td on steam flow meter PPS.1-OVK-PP.1 #08.09.1109 dated 27/05/2010
43.	Calibration Certificate # 24-2/2786 on heat water flow meter SVTU-10M(M2) #15899 dated 11/06/2009
44.	Calibration Protocol for electricity meter SL761B071 #53043936 dated 13/11/2009
45.	Calibration Protocol for electricity meter SL761B071 #53043938 dated 13/11/2009
46.	Calibration Certificate # 24-1-2/9131 on Visbroken Atmospheric Residue meter Promass 80, #D1066E02000 DN 40 dated 06/09/2012
47.	Calibration Certificate # 24-1-1/865 on residual fuel oil meter Promass 80, #D1066F02000 DN 40 dated 08/06/2012
48.	Calibration Certificate # 320-td on steam flow meter PPS.1-OVK-PP.1 #11.09.1110 dated 27/05/2010 dated 21/06/2012
49.	Calibration Certificate # 319-td on steam flow meter PPS.1-OVK-PP.1 #11.09.1112 dated 21/06/2012
50.	Calibration Certificate # 178-td on steam flow meter PPS.1-OVK-PP.1 #08.09.1109 dated 21/06/2012
51.	Calibration Certificate # 277-td on Gas flow metering complex FLOWTEK-TM dated 09/07/2010
52.	Calibration Certificate # 16-td on Gas flow metering complex FLOWTEK-TM dated 11/01/2011
53.	Calibration Certificate # 24-1-1/551 on Refinery gas meter Elite dated 30/07/2010
54.	Calibration Certificate # 24-1-1/450 on residual fuel oil meter Promass 80, #D1066F02000 DN 40 dated 16/07/2010
55.	ERU calculation sheet for the “Cogeneration and Utilization of Waste Heat at LLC "Lukoil Energy and Gas Ukraine" JI project.

APPENDIX A – CHECK LIST FOR VERIFICATION

DVM Paragraph	Check Item	Intial Finding	Action requested to project participants	Review of project participant's action	Conclusion
Project approvals by Parties involved					
90	Has the DFPs of at least one Party involved, other than the host Party, issued a written project approval when submitting the first verification report to the secretariat for publication in accordance with paragraph 38 of the JI guidelines, at the latest?	The project has been approved by the DFPs of the Parties (Host country – Ukraine, Guest Country- Federal Republic of Germany). Appropriate LoA from Guest and Host country were submitted to the verifier and are appropriate. The project is registered as JI project by the DFP of Ukraine (evidence is available at http://www.carbonunitsregistry.gov.ua/en/publication/content/977.htm) and by the Federal Republic of Germany (evidence is available at https://www.jicdm.dehst.de/promechg/pages/project1.aspx).	-	-	OK
91	Are all the written project approvals by Parties involved unconditional?	Project LoAs for the projects are unconditional and are valid till the 31/12/2012	-	-	OK
Project Implementation					
92	Has the project been implemented in accordance	The project has been implemented in general in	-	-	OK

	with the PDD regarding which the determination has been deemed final and is so listed on the UNFCCC JI website?	accordance with the registered PDD. This JI project is registered as Track 1 project and information is available (See Section 1.3 of this report).			
93	What is the status of operation of the project during the monitoring period?	The project operates with its planned operational capacity and has been operating during the whole monitoring period. However, there was observed a break in the operation of cogeneration unit in May 2011-September 2011 connected with the break in operation of Lukoil refinery plant.	-	-	OK
Compliance with monitoring plan					
94	Did the monitoring occur in accordance with the monitoring plan included in the PDD regarding which the determination has been deemed final and is so listed on the UNFCCC JI website?	The monitoring occurs in accordance with the monitoring plan included in the PDD The revisions of emission factor for electricity for 2012, Emission factor for refinery gas and emission factor for VAR are properly justified (cf. Section 3.4. of Verification Report)	-	-	OK
95(a)	For calculating the emission reductions or enhancements of net removals, were key factors, e.g. those listed in 23 (b) (i)-(vii) above, influencing the	For calculating the emission reductions key factors, e.g. those listed in 23 (b) (i)-(vii) above, influencing the baseline emissions as well as risks	CAR 5	Cf. Appendix B	OK

	baseline emissions or net removals and the activity level of the project and the emissions or removals as well as risks associated with the project taken into account, as appropriate?	associated with the project were taken into account, as appropriate. For more detailed information, please, refer to Section B.1 and B.2. of the registered PDD version 2.0.			
95(b)	Are data sources used for calculating emission reductions or enhancements of net removals clearly identified, reliable and transparent?	All main monitoring data as listed in the Section 3.4 of the Verification report has been supported with evidences (cf. references Section of Verification Report). Still, some requests for providing additional evidences and correction of original monitoring data have been submitted to PP (cf. Appendix B)	CAR 3 CAR 4 CAR 6 CAR 7 CAR 8 CAR 10 CAR 12 CL 1 CL 2	cf. Appendix B	OK
95 (c)	Are emission factors, including default emission factors, if used for calculating the emission reductions or enhancements of net removals, selected by carefully balancing accuracy and reasonableness, and appropriately justified of the choice?	The emission factors used to calculate emission reductions are selected in accordance with the registered PDD ver. 2.4. Still, some requests for providing additional evidences and correction of original monitoring data have been submitted to PP (cf. Appendix B)	CAR 4 CAR 6 CAR 7 CL 1	cf. Appendix B	OK

95(d)	Is the calculation of emission reductions or enhancements of net removals calculated based on conservative assumptions and the most plausible scenarios in a transparent manner?	The calculation of emission reductions is done based on conservative assumptions and the most plausible scenarios in a transparent manner. Still, the PP has been asked to provide to the verifier internal monitoring procedure and to present ERU calculation sheet in the readable format	CAR 11 CAR 9	cf. Appendix B	OK
96	Is the relevant threshold to be classified as JI SSC project not exceeded during the monitoring period on an annual average basis?	Emission reduction achieved by the project has not exceeded the annual emission reductions as stated in the approved project PDD, thus the project remains under SSC limit, as stated in PDD.	-	-	OK
Revision of monitoring plan					
99 (a)	Did the project participants provide an appropriate justification for the proposed revision?	Monitoring report was slightly revised by PP. On the opinion of verifier, the revisions of emission factor for electricity for 2012, Emission factor for refinery gas and emission factor for VAR are properly justified (cf. Section 3.4. of Verification Report)	-	-	OK
99 (b)	Does the proposed revision improve the accuracy and/or applicability of information	The revisions made (cf. 99 (a)) are aimed to improve the accuracy of the original data,	-	-	OK

	collected compared to the original monitoring plan without changing conformity with the relevant rules and regulations for the establishment of monitoring plans?	and thus are accepted by the verifier.			
Data management					
101 (a)	Is the implementation of data collection procedures in accordance with the monitoring plan, including the quality control and quality assurance procedures?	Data collection procedure is carried out in accordance with the monitoring plan, including the quality control and quality assurance procedures and has been checked by the verification team on-site.	-	-	OK
101 (b)	Is the function of the monitoring equipment, including its calibration status, is in order?	The monitoring equipment employed by the project has functioned in accordance with the monitoring plan and in general is in order. The verification team has verified that the reported metering devices are in fact installed and operational. The metering devices have appropriate documentation, such as passports and calibration certificates. Calibration has been performed in accordance with the procedures of the Host Party and evidence of these calibrations has been provided (calibration certificates and/or	CAR 2	cf. Appendix B	OK

		evidence of calibration in the passports of the devices). It has been verified that the calibration did occur at the correct calibration intervals for all metering devices. Still, PP has been asked to include the overview of all calibration events in the Monitoring Report.			
101 (c)	Are the evidence and records used for the monitoring maintained in a traceable manner?	The evidence and records used for the monitoring are maintained in a traceable manner. Verification team has got access to all necessary data on monitoring system and emission reductions and received necessary evidence on site.	-	-	OK
101 (d)	Is the data collection and management system for the project in accordance with the monitoring plan?	The data collection and management system for the project is in accordance with the monitoring plan as described in the registered PDD. Roles and responsibilities of the technical staff in the framework of the monitoring are described in the monitoring report. The responsibilities and authorities are described for each individual in job descriptions as required statutorily. Persons working at sites are aware of	-	-	OK

		their responsibilities, and relative records are maintained. Data relevant to the emission reduction calculation properly documented. Therefore, any measurement error can be easily identified, in case of getting values that significantly differ from the common (in case of equal conditions). Education of the personal involved in monitoring was provided by the LLC "Lukoil Energy and Gas Ukraine", equipment producers and specialized organizations. organizations.			

APPENDIX B – RESOLUTION OF CARs, CLs, FARs

Nr	Initial List of Corrective Action Requests (CARs) and clarifications (CLs)	Reference	Summary of project owner response	Determination team conclusion
CARs				
1	Writing error – value for the period 01.01.2012-31.12.2012 must be 30/09/2012, please also control whole MR for the same mistake	MR, p.7, Section B.2.3	Monitoring period was extended until 30th of November, 2012. All necessary revisions with respect to the valid monitoring period from 1st of July, 2010, until 30th of November, 2012 have been made in the MR.	Closed
2	Please Insert the dates of all calibration events from the date of start of the project operation in the B4 section for all monitoring equipment.	MR, Section B.4	Dates of all calibration events for the monitoring period from 1st of July, 2010, until 30th of November, 2012 have been added to the table in the section B.4.	Closed
3	Please sent the invoices on bought mazut by the LEGU for the months Dec 2010, Nov. 2011, May 2012	ERU calculation spreadsheet.	Have been provided.	Closed
4	In The calculations of RG emission factor the Mass fraction of gas, % for July 2010 is indicated as 9,5 % for methane, and in the certificates – 7,9%. Similar mistakes are observed for another months. Please recheck the records in certificates and the data used ERU calculation spreadsheet.	ERU calculation spreadsheet.	All data have been rechecked and revised where appropriate.	Closed

5	Please recheck and correct "Heat output from the cogeneration unit that is supplied to the consumer, Gkal" in "monitoring data" sheet for the months October 2010 and May 2012.	ERU calculation spreadsheet.	Data on heat output for October 2010 and May 2012 have been rechecked. Please, see the value for May 2012 in the respectful data sheet from the archive of the meter SVTU-10M(M2) #15899.	Closed
6	Please correct the data for the NCV of refinery gas, MJ/kg and for Mass fraction of carbon in RG, % for July 2010 in "RG emission Factor" sheet	ERU calculation spreadsheet	The values have been rechecked, and data according to the corresponding certificate for July 2010 on refinery gas have been used in calculations.	Closed
7	Please correct NCV of VAR - Visbroken atmospheric residue net calorific value is given in "Fixed value" sheet as 38,97 GJ/t as in PDD whereas in "VAR emission factor" sheet - 40,63 GJ/t is used.	ERU calculation spreadsheet.	Response #1. NCV and carbon content of VAR have been used according to the EIA of the project. In our opinion, it is more accurate to use data from one source for EF calculation as net calorific value of the fossil fuel significantly depends on the carbon content of the fuel. However, NCV=38,97 GJ/t was set according Technical Conditions on VAR, where carbon content is not reflected. Thus, using 38.97 GJ/t instead of 40.63 GJ/t for VAR with carbon content as for 40.63 GJ/t may not reflect the accuracy of the value for EF.	

	Please clarify which NCV for VAR is used for the calculation in Excel sheet- as according to PDD - 40.63 GJ/t or new value 38.97 GJ/t. Only one NCV value shall be applied in the calculations, the presence of two different values lead to the confusion.		Response #2. Conservative value 38.8 GJ/t has been used.	Closed
8	The oxidation factor used in calculations of VAR is given as 0.99, whereas this value is specific for mazut, as provided in the ГКД 34.02.305-2002_EF of VAR calculation (p.13).doc. at the same time, oxidation factor is set in PDD as 1 for VAR. Please provide justification of the usage of 0.99 value for VAR same as for residual fuel oil (mazut).	ERU calculation spreadsheet.	Oxidation factor for VAR that is equal to 0.99 has been set according to the table 1-4 "Fraction of Carbon Oxidized", value for oil and oil products, p. 1.8 of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, Module 1.	Closed
9	Please resent the ERUs calculation file in the readable common format (i.e. with columns indicating letters and rows numbers)– namely, the columns are currently given in numbers, what makes the reading of formulas in calculation file very difficult	ERU calculation spreadsheet.	ERUs calculation file was formatted.	Closed
10	Please provide supporting evidences on the data presented in ERU calc. sheet for Electricity supply by cogeneration unit to the grid, Residual fuel oil consumption (in overview monthly signed and stamped by the plant), Diesel fuel consumption (in overview monthly signed and stamped by the plant), Natural gas consumption, VAR consumption and Refinery gas consumption over the whole monitoring period.	ERU calculation spreadsheet.	All necessary documents have been provided.	Closed

11	Please provide Special Monitoring Procedure which was introduced at the Enterprise (as mentioned on p.12 in MR)	Monitoring Report	Has been provided. Has been resent.	Closed
12	Please provide certificates on NCV of natural gas	ERU calculation spreadsheet	Have been provided.	Closed
CLs				
1	EFCO2, DF - the emission factor for diesel fuel, kg was identified in PDD to be equal to 74.1 kg CO2/GJ, in MR same value is used, but in ERUs calc. Sheet the value is 69,3. Please explain	ERU calculation spreadsheet Monitoring Report	EF_{CO2}, DF has been corrected. The value 74.1 kg CO_2/GJ is used.	Closed
2	EF CO2 VAR- this value is calculated in ERUs calc. sheet as 77.434 kg CO2/GJ, whereas in MR it is 74.27 on p. 8. Please clarify.	ERU calculation spreadsheet Monitoring Report	EF_{CO2} for VAR has been corrected. The value 77.78 is used.	Closed