

JOINT IMPLEMENTATION PROJECT

"Modernization of Company Equipment by Change of Fuel Type from Residual Oil to Natural Gas at the LTD "PFC"

(the project name)

The fifth monitoring report covering the period from 01.09.2010 until 31.12.2010

Position of the head of organization,
institution or establishment compiling
the document

Director General of LLC "Center TEST"
(position)



N.F. Kolesnikova
(full name of person)

(Seal place)

**SEAL: Limited Liability Company
"Center TEST".
Identification code 32349482,
Ukraine, Kyiv city**

Position of the head of economic entity
owning the source to be used as the basis
for the joint implementation project

Director General of LTD "PFC"
(position)



M.V. Novikov
(full name of person)

(Seal place)

**SEAL: Limited Liability Company
"Pobuzhsky Ferronickel Works".
Identification code 31076956,
Ukraine, Kyiv city**

The city of Kyiv
March 2011

JI monitoring report form

Monitoring period: 01.09.2010 – 31.12.2010

Version: 02

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- B.** Key monitoring activities
- C.** Quality assurance and quality control measures
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Section A. General information of project activity and monitoring

A.1. Title of the project activity

"Modernization of an enterprise regarding fuel switching from fuel oil to natural gas at Ltd. "PFC".

A.2. JI registration number

Projects ITL number is UA1000143.

A.3. Brief description of the project activity

The main project purpose is to reduce greenhouse gas (GHG) emission due to fuel switching from fuel oil to natural gas. GHG emission reduction can be achieved by modernization of a fuel system.

To fulfill this project the enterprise constructed a gas pipeline connected to the public gas transmission system, which provided use of natural gas instead of fuel oil for combustion in the respective production. Also, in order to increase efficiency of natural gas using the enterprise replaced gas burners.

Due to the absence of the project for production at the enterprise fuel oil was used as fuel, and the main greenhouse gas emissions from fuel combustion are CO₂ emissions. The proposed project allowed the enterprise to switch from oil fuel to another one – natural gas. Greenhouse gas emissions will be reduced at the expense of the fact that carbon content in fuel oil is much higher than in natural gas, and the lower combustion value of fuel oil is much higher compared to natural gas.

A.4. Monitoring period

Starting date: 01.09.2010

End date: 31.12.2010

A.5. Project activity methodologies

The methodology ACM0009 "Consolidated methodology for industrial fuel switching from coal or petroleum fuels to natural gas" (Version 3.2) was used for the baseline defining and development of the monitoring plan.

A.6. Status of implementation including the schedule of major project parts

Table 1

| Activity | Starting date |
|---|------------------|
| Construction of the gas pipeline that connected to the public gas transmission system, which allowed to switch from oil fuel to natural gas | 12 July 2005 |
| Installation of redesigned gas burners | 11 December 2008 |

Status of implementation is according to the PDD version 05.

A.7. Planned discrepancies and revision of registered PDD

There are no deviations from registered PDD.

According to Monitoring the reporting period, which is 4 months, there was an increase of emission reduction units compared to the value specified in the PDD of 33 252,33 tons of CO₂ equivalent to 38 847 t CO₂ eq.

This is due to increasing production at Ltd. "PFC" compared with the amount that was predicted in the development of PDD, which led to increasing consumption of natural gas fuel system of the predicted value in PDD 27,164 million m³ to 30,758 million m³. Quantity of natural gas consumption is a key factor in monitoring.

Also, the increase of reducing emissions during the reporting period is concerned with efficiency than the actual value of the fuel system, the average is the average for the last 4 months of 2010 actually amounted to 74.43% compared to the number listed in the PDD expected value equal to 73.5 %. Energy fuel system operating on natural gas is also one of the key factors in the monitoring.

A.8. Planned discrepancies and revision of registered monitoring plan

The changes were provided to the monitoring plan considering the NCV estimation. "National Cadaster of Anthropogenic Emissions and Greenhouse Gas Absorption of Ukraine for 1990-2008" (from now on – "National Cadaster of Ukraine") was used to estimate this parameter during previous monitoring periods but in order to increase level of accuracy data from SE "Ukrtransgas" and UMG "Cherkasytransgas", which is gas provider for Ltd. "PFC", were used.

Also in this Monitoring changes have been made in respect of measuring instruments used to measure the amount of natural gas consumed. This is due to the fact that in October 2010 to Ltd. "PFC" were put into operation two new drying drums (GM-1, GM-2 in Figure 1) that run on natural gas and not included in the project limits.

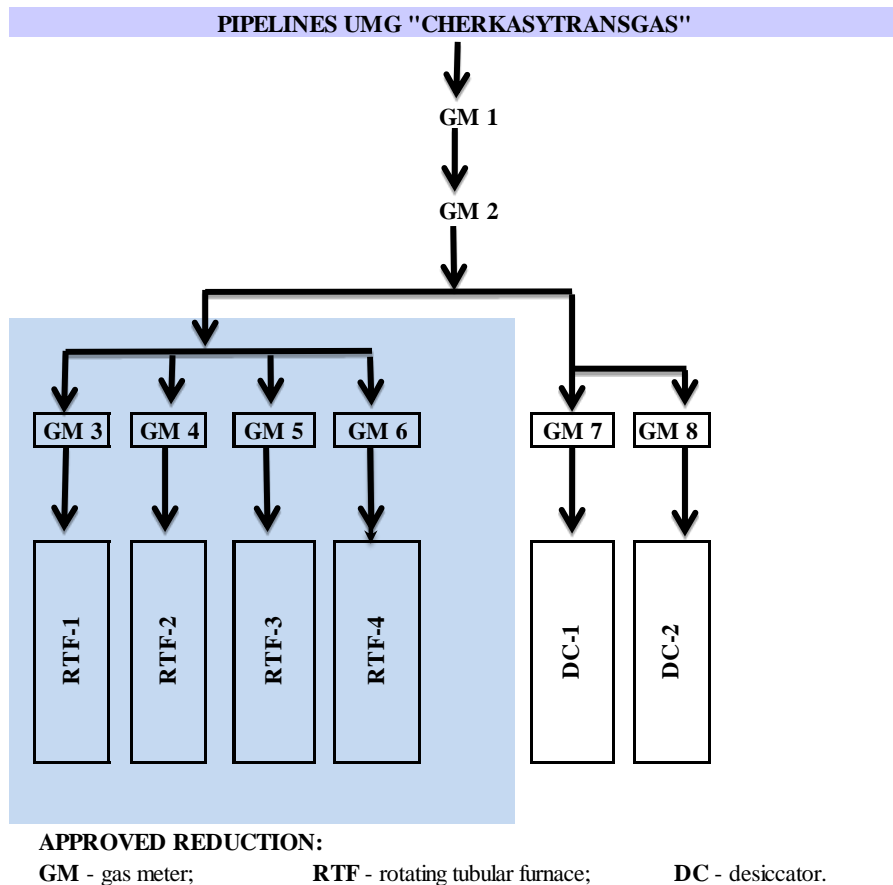


Figure 1 - Schematic diagram of gas supply technological capacities Ltd. "PFC"

To account for the quantity of natural gas consumed fuel system Ltd. "PFC", which is included in the scope of the project and consists of four tubular rotary kilns (RTF -1 RTF- 2 RTF- 3 RTF -4 in Figure 1) instead of 2 X-commercial natural gas meters type "TZ / FLUXI" (GM-5 GM-6 in Figure 1), used four technological-type meters of natural gas GM-K-Ex installed immediately before the tubular rotary furnace (GM -1 GM -2 GM -3 GM -4 in Figure 1).

A.9. Responsible personnel, who are obliged to develop and present monitoring report,

Ltd. "PFC":

Victor Romanenko – Chief engineer

Section B. Key monitoring activities

B.1. Monitoring activity

Key monitoring activities:

- measuring the consumption of fuel (natural gas) tubular rotary furnace;
- information on net calorific value of natural gas from Haysyn LVUMH UMG "Cherkasitransgaz" SE "Ukrtransgas";
- estimation of energy efficiency of the system working on the natural gas.

Natural gas consumption is measured directly with the help of gas flue meters. Gas flue meter is connected to the gas pipeline and is providing the measurement of natural gas consumption entering the system.

Net calorific value of gas taken according to the measurement of chemical-analytical laboratory Haysyn LVUMH UMG "Cherkasitransgaz" SE "Ukrtransgas", which is a supplier of natural gas for Ltd. "PFC". The above laboratory certified in the State Standard of Ukraine.

The calculation is based on energy efficiency data as gas, passport gas burners and HOST 21204.

B.2. Type of monitoring equipment

Measurement of natural gas by using gas meter turbine GM-K-Ex, which made the state register of measuring instruments in Ukraine № 666-02. Meter equipped proof-readers SPG 761, which provide the correction of measured data depending on the temperature, density, proportion of nitrogen dioxide and particles consisting of natural gas.

In Ltd. "PFC" these counters are used for internal accounting energy resources. According to Article 4.1.1 of DSTU 2708:2006 measuring devices used in enterprises and organizations for internal accounting of energy and material resources not subject to mandatory state periodic verification, so Ltd. "PFC" for them was a certain period of time in calibration three years.

According to the order of the Director Ltd. "PFC" period from 01.04.2011 verification of gas meters changed to two years (according to passport).

B.2.2. Table that presents information about measurement equipment's (including producer, type, serial number, installation date, last verification date, uncertainty information, replacement need or alteration)

Corresponding data is presented in the Table 2.

Table 2

| Measurement device | Producer | Measurement parameter | Type | Serial number | Uncertainty | Last verification date | Next verification date | Comment |
|--------------------|---|---|------------------------|---------------|---|------------------------|------------------------|---------|
| Turbine gas meter | OJSC "Ivano-Frankivsk plant "Industrial Instrumentation", Ukraine | Natural gas consumption rotating tubular kiln RTF-1 | GM-K-150-650-1,6-1-Ex | 6375 | Maximum relative allowable uncertainty 2% | 05.05.2010 | in 3 years | |
| Turbine gas meter | OJSC "Ivano-Frankivsk plant "Industrial Instrumentation", Ukraine | Natural gas consumption rotating tubular kiln RTF-2 | GM-K-150-1/30-1,6-1-Ex | 9044 | Maximum relative allowable uncertainty 2% | 11.01.2010 | in 3 years | |
| Turbine gas meter | OJSC "Ivano-Frankivsk plant "Industrial Instrumentation", Ukraine | Natural gas consumption rotating tubular kiln RTF-3 | GM-K-150-1/30-1,6-1-Ex | 9036 | Maximum relative allowable uncertainty 2% | 13.03.2010 | in 3 years | |
| Turbine gas meter | OJSC "Ivano-Frankivsk plant "Industrial Instrumentation", Ukraine | Natural gas consumption rotating tubular kiln RTF-4 | GM-K-150-1/30-1,6-1-Ex | 9449 | Maximum relative allowable uncertainty 2% | 16.05.2010 | in 3 years | |

B.2.3. Verification procedure

Gas meters are not subject to mandatory state verification in accordance with Article 4.1.1 of ISO 2708:2006. Data on calibration procedures are presented in the table 3.

Table 3

| Parameter | Response |
|--|--|
| Measurement device (MD) | Turbine gas meter GM-K-Ex |
| Calibration interval | 2 years (according to the passport) |
| Verification methodology and procedure | Fb2.748.008 D2 Guide. Metrology. Counter Gas Turbine GM-K-Ah (SG). Methods of verification (according to passport). Identified by SE "Vinnitsa Research and Production Center of Standardization, Metrology and Certification" |
| Responsible authority for verification and certification of MD | SE "Vinnitsa Research and Production Center of Standardization, Metrology and Certification" |

B.2.4. Third parties involved

SE "Vinnitsa Research and Production Center of Standardization, Metrology and Certification" is authorized to conduct of verification and calibration of the measurement devices.

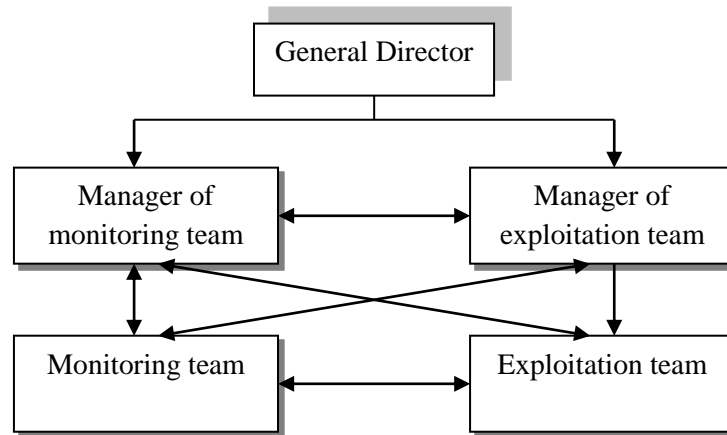
SE "Western expert-technical center of the national research-scientific institute of the production and labor safety" performs the calculations of the energy efficiency of the system. State Enterprise "Western expert-technical center of the national research-scientific institute of the production and labor safety" is authorized to perform this kind of work and possess all the required licenses.

Measuring chemical-analytical laboratory Haysyn LVUMH Measure net calorific value of natural gas to be transferred and adopted Gaysinsky LVUHM Ltd. "PFC". The laboratory is certified in the State Standard of Ukraine, has a certificate of qualification issued PU-0078/09 02.06.2009 which was valid until 02.06.2014.

Calculation of efficiency of the system working on fuel oil was performed by LTD "Ukr TEST", which possess all required licenses. At the time of the settlement enterprise Ltd NDTSNSE "Ukr TEST" had all the necessary permissions.

B.3. Data collection (data collected while the whole monitoring period)

Management structure of monitoring is presented in the picture 2.



Picture 2- Management structure of monitoring and operation

Exploitation team is responsible to perform data measurement and data collection in compliance with measurement results. Exploitation team transfers measurement results to monitoring team for estimation of GHG emissions reduction. Monitoring team is also responsible to collect data that data that cannot be measured but need to be monitored.

According to the measurement results, there was identified corresponding data that uses to estimate emissions reduction. Values of this data are presented in the table 4 in compliance with symbols identified in the PDD.

Table 4

| Title | Symbol | Value and Data unit | |
|--|------------------------------|---------------------|------------------------|
| | | Month | mln. m ³ |
| Volume of natural gas consumed | FF _{project, NG, y} | Month | mln. m ³ |
| | | September | 7,824 |
| | | October | 8,416 |
| | | November | 6,909 |
| | | December | 7,608 |
| Energy efficiency of the system working on the natural gas | ε _{NG} | Month | % |
| | | September | 76,3 |
| | | October | 75,5 |
| | | November | 73,8 |
| | | December | 72,1 |
| Lower combustion temperature of natural gas | NCV _{NG} | Month | TG/mln. m ³ |
| | | September | 8,091 |
| | | October | 8,069 |
| | | November | 8,058 |
| | | December | 8,049 |

B.3.1. List of other parameters that uses to estimation

Other parameters that are used for estimation of emissions reduction have no need to be measured. The list of these parameters is presented in the table 5. Titles of the parameters are indicated in the table 5 according to the titles presented in the PDD.

Table 5

| Title | Symbol | Value and Data unit | Source of data |
|---|-----------------------|--------------------------------|--|
| CO ₂ equ emission factor for natural gas | EF _{NG, co2} | 55,82 t CO ₂ /TJ | "National Cadaster of Ukraine" and IPCC, 1996 |
| CO ₂ equ emission factor for fuel oil | EF _{BO, co2} | 76,59 t CO ₂ /TJ | "National Cadaster of Ukraine" and IPCC, 1996 |
| Energy efficiency of a system fired with fuel oil | ε _{BO} | 61,2% | This value was estimated on the basis of statistics of system working that fired with fuel oil |

B.3.2. Data of leakages

This section is not applicable to the project.

B.3.3. Environmental impacts

The proposed interference into the existing production scheme has a positive environmental impact owing to switching of Ltd. "PFC" from fuel oil to natural gas and will correspondingly lead to greenhouse gas emissions reduction into the air.

Emissions reduction will occur as a result of realization of this project, namely: at the expense of the fact that carbon content in fuel oil is much higher than in natural gas, and lower calorific value of fuel oil is higher than in natural gas.

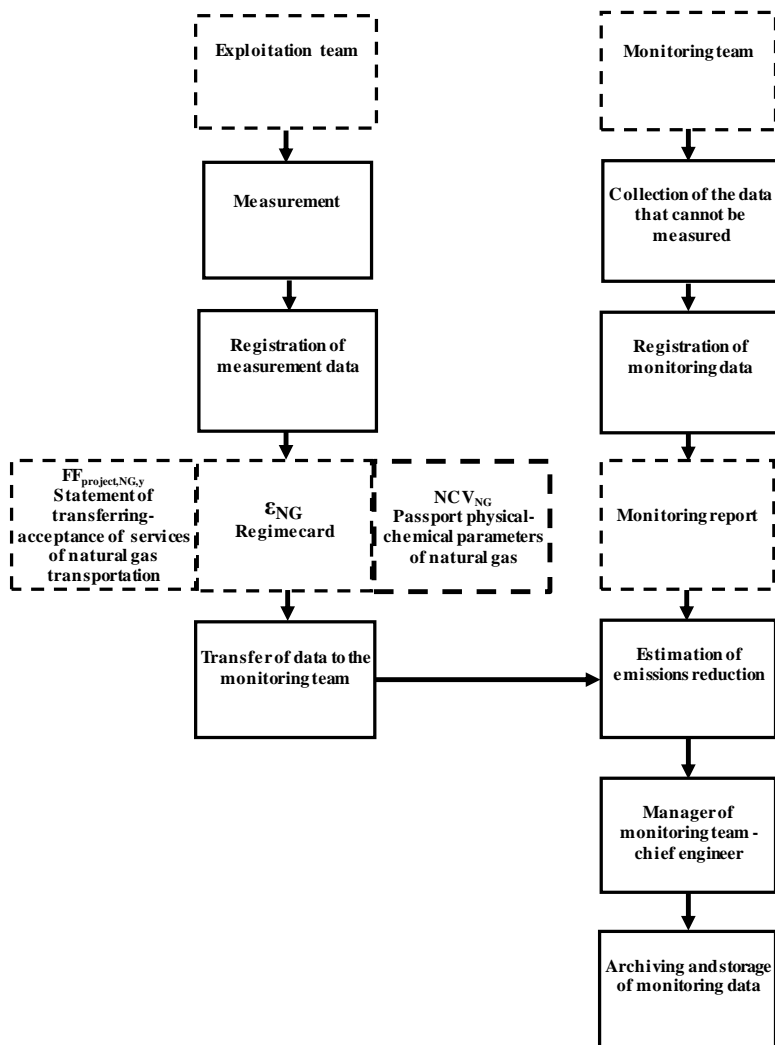
Emissions reduction, achieved as a result of implementation of this project, has environmental impact in Ukraine and does not impact greenhouse gas emissions abroad Ukraine.

Environment Impact Assessment (EIA) has been conducted for the proposed JI project. The environmental characteristics and impact evaluation in compliance with EIA has been presented in the PDD version 05. According to the EIA opinion, fuel switch on the enterprise will lead to the significant pollutant emissions reductions of the fuel system that will have positive effect on the population of the nearby area.

B.3.4. Data processing and data archiving

All monitoring data is required to be saved in a paper way. Measurement performance and data archiving is envisaged to the exploitation team. The measurement results are given to the monitoring team for the estimation of GHG emissions reductions. The monitoring team responsibilities are collection of the data that cannot be measured, but need to be monitored. The Chief Engineer is responsible for preparation and archiving of monitoring reports.

In the picture 3 there is presented the scheme of data collection and data archiving of monitoring.



Picture 3 – The scheme of data collection and data archiving of monitoring

B.3.5. Registration of special cases and technological accidents

There were no registered special cases and technological accidents while the monitoring period.

Section C. Quality assurance and quality control measures

C.1. Registered procedures and management plan

C.1.1. Roles and responsibilities

General director of Ltd. "PFC" assigns the responsible personnel, who are obliged to provide exploitation and maintenance of the fuel system as well as providing stability and effectiveness of system work. These functions are as well foreseeing all necessary for monitoring data registration. Personnel are also responsible for maintaining optimal exploitation level.

Functions and responsibilities of monitoring team determined by the Order of General Director of Ltd. "PFC" №294 dated 23.11.2009. Monitoring staff identified by the Order of General Director of Ltd. "PFC" №300 dated 30.11.2009.

The fuel system performance monitoring group is headed by Chief Engineer of Ltd. "PFC". Monitoring is conducted in close contact with the exploitation team and include monitoring, as well as analysis and archiving of all monitoring data. Calculation of the emission reduction volume is also an obligation of the monitoring team. Periodical data on natural gas consumption is analyzed in respect of the respective registered factors provided by the exploitation team to confirm their consistency. In case of discrepancies between the data their origin may be established in cooperation with the exploitation team. If any discrepancy is detected in monitoring data, respective adjustment shall be made in the monitoring system of a respective factor or the monitoring system of the fuel system.

The Chief Engineer is responsible for preparation and archiving of monitoring reports. The General Director regularly analyses the consolidated monitoring data and respective documentation.

Measurement performance and measurement data archiving is envisaged to the exploitation team. The measurement results are given to the monitoring team for the estimation of emission reductions. The monitoring team responsibilities are collection of the data that cannot be measured, but need to be monitored. Measurement results of natural gas consumption are registered as Statement of transferring-acceptance of services of natural gas transportation that signed by representatives of Ltd. "PFC" and an enterprise that supplies natural gas. Estimation results of energy efficiency of the system working fired with natural gas are registered as a regime card.

Monitoring data is kept during all crediting period and for 2 years after the last estimation of emissions reduction units.

C.1.2. Training

Exploitation team of the Ltd. "PFC" has completed the training of exploitation and performance of the corresponding warning measures of the fuel system.

C.2. Measures of internal audits and control

The staff of Ltd. "PFC" is subjected to periodic verification of knowledge of labor protection and safety measures while working with the fuel system. Measurement devices that used for monitoring are subjected to the state periodic verification.

While using gas meter it is necessary to follow the requirements of exploitation identified in the passport of the meter. According to the passport, gas meters need not a special technical maintenance. In case of the gas meter need repair, it has to be sent to an enterprise that produce the meter (an address is presented in passport of the meter).

The chief metrology's of Ltd. "PFC" is responsible for maintenance of gas meters and if necessary sending on time these meters to the repair. While the meter is being repaired, monitoring data of natural gas consumption is collected by the enterprise that supply of natural gas. The enterprise that supplies natural gas performs permanent measurement of amount of natural gas that is supplied. Due to this mechanism, the risk of absence of monitoring data for performance of emission reduction estimation is absent.

Section D. Estimation of greenhouse gas emissions reduction

D.1. Project emissions

Emissions under the project scenario are calculated using the following formula:

$$PE_y = 4,1868 \cdot FF_{\text{project, NG, y}} \cdot NCV_{\text{NG}} \cdot EF_{\text{NG, co2}},$$

where:

4.1868 - calculation factor Weaving was practiced in TJ, TJ / Weaving was practiced;

PE_y – annual emissions under the project scenario, tons of CO_2 equ;

$FF_{\text{project, NG, y}}$ – annual volume of flared natural gas, million m^3 ;

NCV_{NG} – lower combustion temperature of natural gas, TJ/million m^3 ;

$EF_{\text{NG, co2}}$ – CO_2 equ emission factor for natural gas, t CO_2 equ /TJ.

Monitoring data for reporting period are presented in the Tables 4 and 5 of the monitoring report.

Project emission reductions during monitoring period are presented in the Table 6.

Table 6

| Month | Emissions for the project scenario, t CO_2 eq. |
|--------------|---|
| September | 14 795 |
| October | 15 871 |
| November | 13 012 |
| December | 14 312 |
| Total | 57 990 |

According to the project scenario, emissions for reporting period were 57 990 t CO_2 eq.

D.2. Baseline emissions

Emissions under the baseline scenario are calculated using the following formula:

$$BE_y = FF_{\text{baseline, BO, y}} \cdot NCV_{\text{BO}} \cdot EF_{\text{BO, co2}},$$

where:

$$FF_{\text{baseline, BO, y}} = \frac{FF_{\text{project, NG, y}} \cdot NCV_{\text{NG}} \cdot \varepsilon_{\text{NG}}}{NCV_{\text{BO}} \cdot \varepsilon_{\text{BO}}},$$

Based on the above formulas, we get the final formula for calculating the baseline emissions:

$$BE_y = 4,1868 \cdot FF_{\text{project, NG, y}} \cdot NCV_{\text{NG}} \cdot EF_{\text{BO, co2}} \cdot \varepsilon_{\text{NG}} / \varepsilon_{\text{BO}},$$

where:

BE_y – annual baseline emissions, tons of CO_2 equ;

4.1868 - calculation factor Weaving was practiced in TJ, TJ / Weaving was practiced;

$FF_{\text{baseline, BO, y}}$ – annual volume of flared fuel oil in case of absence of the project, thousand tons;

NCV_{BO} – lower combustion temperature of fuel oil, TJ/thousand tons;

$EF_{\text{BO, co2}}$ – CO_2 equ emission factor for fuel oil, t CO_2 equ /TJ;

$FF_{\text{project, NG, y}}$ – annual volume of flared natural gas, million m³;
 NCV_{NG} – lower combustion temperature of natural gas, TJ/million m³;
 ϵ_{NG} – energy efficiency of a system fired with natural gas;
 ϵ_{BO} – energy efficiency of a system fired with fuel oil.

Monitoring data for reporting period are presented in the Tables 4 and 5 of the monitoring report.

Project emission reductions during monitoring period are presented in the Table 7.

Table 7

| Month | Emissions for the baseline scenario, t CO _{2eq.} |
|--------------|---|
| September | 25 308 |
| October | 26 865 |
| November | 21 529 |
| December | 23 135 |
| Total | 96 837 |

According to the baseline scenario, emissions for reporting period were 96 837 t CO_{2 eq.}

D.3. Leakages

This section is not applicable for the project.

D.4. Emissions reduction for monitoring period

Emission reductions for the monitoring period are presented in the Table 8.

Table 8

| Month | Emission reductions, t CO _{2eq.} |
|--------------|---|
| September | 10 513 |
| October | 10 994 |
| November | 8 517 |
| December | 8 823 |
| Total | 38 847 |

Emissions reduction for monitoring period is 38 847 t CO_{2 eq.}