

Monitoring report

On Joint Implementation project

**«Technical re-equipment of Chelyabinsk CHPP-3 with
putting into operation of a combined-cycle gas plant»**

Monitoring period: 01.07.2012 – 30.09.2012

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Section A. General information on project activity

A.1. Introduction

The aim of this report – representation of the results of monitoring and calculation of volume of Emission Reduction Units (ERUs) generated as a result of realization of the Joint Implementation project “Technical re-equipment of Chelyabinsk CHPP-3 with putting into operation of a combined-cycle gas plant” for the period from 1st July 2012 to 30th September 2012.

The technical design on the project is to enlarge the Chelyabinsk CHPP-3 with a combined cycle gas turbine power-generating unit of 220 MW capacity, plant number 3. Construction-and-assembling operations were finished in April 2011. Permission for start of the object’s operation was received from administration of Chelyabinsk city by 19 May 2011.

The considered project was approved in Russian Federation as a Host Party by the order of Ministry of economic development #112 of 12th March 2012. The Letter of Approval from Finland YM4/44/2012 has been received by 23rd May 2012.

A.2. Brief description of the project

According to the project design developed for CHPP-3 the combined-cycle gas turbine plant (CCGT) of 220 MW capacity consists of:

- Gas turbine GTE-160 of OJSC «Silovie machini» – “LMZ”;
- Steam turbine T-50/70-6.8/0.12 of OJSC “KTZ” Kaluga;
- Steam boiler P-134 OJSC “Engineering Company “ZIOMAR”

Greenhouse gas emissions will be reduced due to the displacement of electricity from the grid by the electricity generated by Chelyabinsk CHPP-3 that will produce electricity with lower carbon intensity in comparison with electricity from the grid. The heat produced at the new unit in the form of hot water will be supplied by means of far district heating system in the heating networks of city Chelyabinsk. The additional amount of heat will allow refusing the construction of new boilers and extension of existing heat supply sources in city Chelyabinsk, which have no sufficient heat reserve.

Table A.2.1. Status of the project implementation

Stage	Status
The contract # 2323 of the general contracting for the construction of "turnkey" power block # 3 of the Chelyabinsk CHPP-3	Signed by 20 th March 2008 between OJSC “TGC-10” (previous owner of the plant) and CJSC “Interelectro”
Act of formal acceptance of the completed construction by the acceptance committee	Approved in May 2011 by acceptance committee of the OJSC “Fortum” (data was not designated)
Certificate of compliance of the reconstructed object of capital construction with requirements of technical regulations, other regulations and design documentation # Ch-289	Issued to OJSC “Fortum” by Urals Department of Federal Service on environmental, technological and nuclear supervision by 17 th May 2011
Permission for start of the object’s operation	Issued by administration of Chelyabinsk city by 19 th May 2011

A.3. Emission reduction for monitored period

Detailed calculations of the generation of Emission Reduction Units are presented in Section D.

Actual volume:

from 1st July 2012 to 30th September 2012: 63 772 tonnes CO_{2eq}

According to the PDD, version 7 of 25th November 2010 the estimated volume of ERUs:

from 1st January to 31st December 2012: 381 898 tonnes CO_{2eq}

Actual generation of ERUs in annual calculation is lesser so far than estimated in the PDD however it can be correctly compared with a planned one only after the end of 2012 as in warm time period of the year the load of CHP is lower.

A.4. Contact information of project participants

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B. System of monitoring of greenhouse gases emission reduction

B.1 Information on the collection and archiving of information on the environmental impacts of the project

In accordance with Federal Law #7-FZ of 10.01.2002 "On Environmental Protection" the heads of organizations and professionals who are responsible for making decisions in course of economic activities that have a negative impact on the environment must be trained in the field of environmental protection and environmental safety. In the staff of the Chelyabinsk CHPP-3 there is a specialist for the environmental safety which is responsible for ensuring compliance of the enterprise with environmental rules and regulations and acquisition of state permits for emissions and discharges of hazardous substances, waste disposal.

In accordance with the requirements of Articles 14, 22 of the Federal Law "On Environmental Protection" Chelyabinsk CHPP-3 of OJSC "Fortum" has a design of norms for maximum permissible emissions (MPE), developed in 2007. There is a statement in the annotation to this document that after the commissioning of power-generating unit #3 of CHPP-3 the emissions of harmful substances (pollutants) will not exceed the maximum permissible concentration that is confirmed by perspective dissipation calculations and therefore temporarily agreed emissions have not been established.

Rostekhnadzor issued a permit for emission of harmful substances (pollutants) into the air # 1407/p, effective from December 12, 2007 to December 12, 2012 (validity period of MPE document).

Besides of periodic monitoring of compliance with MPE by sources of industrial emissions the Chelyabinsk CHPP-3 carries out an instrumental control of quality of air at the border of the sanitary protection zone and in the closest point of the populated area. This program is approved by Rospotrebnadzor of Chelyabinsk region.

Monitoring of compliance with the norms for maximum allowable discharges into the pool of Chelyabinsk CHPP-3 is performed in accordance with the Program of regular observations on the water body and water protection area approved by the director of Chelyabinsk CHPP-3 together with the head of the department of water resources in the Chelyabinsk region of the Federal water resources Agency and head of Rospotrebnadzor of Chelyabinsk region.

B.2 Methodological approach for monitoring implementation

Monitoring of greenhouse gases emissions in the project and baseline was performed mainly in accordance with PDD, version 7 of 25/11/2010 except deviations described in Section C.

Project applies JI specific approach in accordance with principles of Guidance on criteria for baseline setting and monitoring, version 03.

Project boundary include (see. Pic. B.2.1 below):

- Power-generating unit #3 of Chelyabinsk CHPP-3 (combined-cycle gas plant);
- Auxiliary equipment of CCGT plant;
- Thermal power plants of Integrated Power Systems of Urals and Mid Volga (see Annex 2 of the PDD version 7 of 25/11/2010);
- New gas fired boilers at the boiler houses of Tyumen city in the absence of the CCGT plant

Picture B.2.1 Project boundary with monitoring points

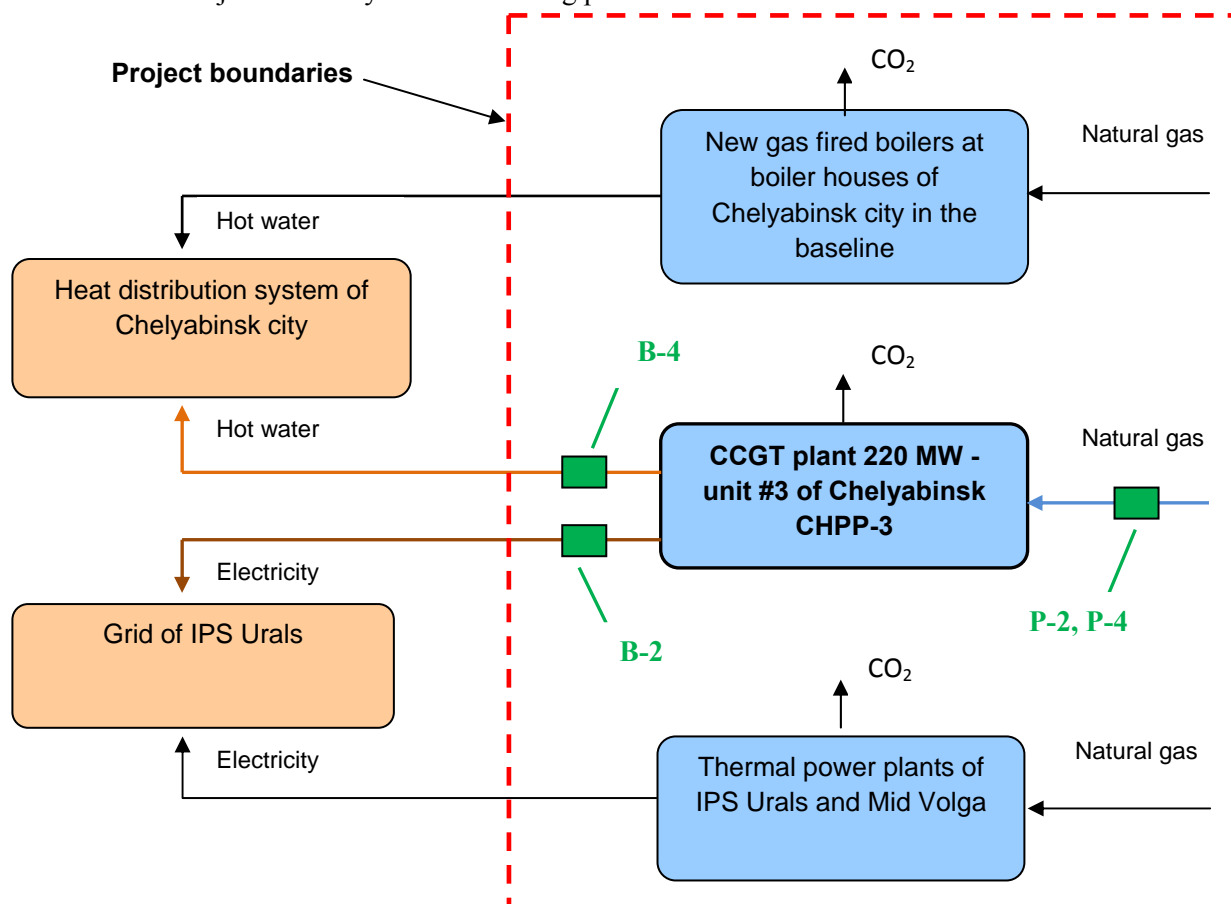


Table B.2.1. Parameters monitored during crediting period

# of point ¹	Parameter, unit of measurement	Designator	Periodicity of measurement	Source of data at Tyumen CHPP-1
P-2	Consumption of natural gas by power-generating unit #3 (CCGT), ths. m ³	FC _{NG,y}	Constantly	Program-technical complex (PTC) "Ovation" – Automated system of process control (ASPC) of power-generating unit #3 (Emerson company ²)
P-4	Net calorific value of natural gas, kcal/m ³	NCV _{NG,y}	Weekly at the average	Own laboratory. Protocols of gas quality analysis
B-2	Output of electricity to external consumers from power-generating unit #3 (CCGT), ths. kWh	EG _{PJ,y}	Constantly	System of automated information-measuring for commercial accounting of electric power (SAIIM CAEP)
B-4	Output of heat to external consumers from power-generating unit #3 (CCGT), Gcal	HG _{PJ,y}	Constantly	PTC "Ovation"

¹ Tables D.1.1.1. и D.1.1.3. of PDD, version 7 of 25/11/2010

² <http://www.sealtek.ru/energo/ptk-emerson/>

Table B.2.2. Data and parameters fixed ex-ante in the PDD, version 7 of 25/11/2010

# of point ³	Parameter, unit of measurement	Designator	Value
P-5	Coefficient of CO ₂ emissions for natural gas, tones CO ₂ /TJ	$EF_{CO_2, NG, y}$	56,1
B-3	Combined CO ₂ emission factor for grid electricity produced in IPS of Urals and Mid Volga, tonnes CO ₂ /MWh	$EF_{CO_2 grid y}$	0,5772
-	Efficiency of new gas fired boilers in the baseline, %	η_{boiler}	93,3

At the moment Chelyabinsk CHPP-3 consist of 2 identical steam power units (plant #1 and #2) and one CCGT unit (plant #3) as well as peak water heating boilers. Installed capacity of each steam power unit is 180/210 MW. Gas supply of Chelyabinsk CHPP-3 is provided by 2 gas distribution points of high pressure.

Despite the fact that gas distribution points have verified metering units with commercial class counting their data is impossible to apply for the monitoring of considered project as they represent the total natural gas consumption by all equipment.

For monitoring of the consumption of natural gas by power-generating unit # 3 considered in this project the technical class metering unit installed in the gas treatment point for gas turbine. This unit has a chamber orifice plate, temperature and pressure sensors that measure the temperature of the gas passing through the orifice, the gas pressure and the differential pressure of gas on the orifice. Bringing the gas flow to normal conditions is performed by Program-technical complex “Ovation” installed as a part of the equipment package of unit #3. Data of ASPC is stored at the special server for 1 year and then is transferred to the external information-carrying medium by the personnel of Service of maintenance and repair of ASPC.

Measurement of the electricity output from power-generating unit #3 is performed by five multifunctional three-phase electric energy meters “Alpha 1800” (A1802RALXQ-P4GB-DW-4) and two multifunctional three-phase electric energy meters EuroALPHA integrated into the certified System of automated information-measuring for commercial accounting of electric power (SAIIM CAEP)

Output of the heat energy to the external consumers from CCGT unit is carried out by means of block of heat exchangers consisted of two horizontal heaters of grid water (HHGW) and one water-water heat exchanger (WWHE). The calculation of the amount of the heat output is done by measurement of the water flow in the pipeline supplying the hot water to the grid and difference of the grid water temperature before and after block of heat exchangers. Hot water is directed to the external consumers through the main plant collector.

B.3 Organization of the monitoring implementation

OJSC “Fortum” has several projects registered as Joint Implementation in Russian Federation and coordinates the work on them on the corporate level.

For operation of the project monitoring at Chelyabinsk CHPP-3 in 2012 there was no need for introduction of the new reporting forms the existing source of data were used – Extract from corporate information system SAP of OJSC “Fortum” for 3rd quarter 2012.

³ Tables D.1.1.1. и D.1.1.3. of PDD, version 6 of 14/09/2010

Main function for data processing and preparation of respective technical reporting is hold by Group of accounting. The plant operates the document exchange in electronic form. All reporting forms are sent monthly to the Department of management of portfolio of production and trading of OJSC “Fortum” situated in Moscow.

Storage of all records on monitoring for II project (describing the period from May 1, 2011 to December 31, 2012) in paper/electronic form is provided until January 1, 2015.

B.4 Metrological support of the monitoring for power-generating unit #3 (CCGT)

Table B.4.1. Measurement equipment and systems used for monitoring and status of their verification/calibration

Type of the device	Accuracy class (inaccuracy)	Date of previous calibration/ver ification	Periodicity of verificaton/calib ration	Note
Consumption of the natural gas by the GTU				
Chamber orifice plate DKS-10-200, d ₂₀ =119,21 mm	-	31.01.2011	4 years	
Temperature transducer TPTU-1-1/142, serial number 9552	0,5	15.10.2010	2 years	
Differential pressure sensor EJA110A, serial number 91K849855	0,075%	27.08.2010	3 years	
Excess pressure sensor EJA530A, serial number 91K926500	0,075%	03.09.2012	2 years	Previous verification 03.09.2010
Output of heat energy, grid water before block of heat exchangers				
Differential pressure sensor EJA110A, serial number 91K850214	0,075%	27.08.2010	3 years	
Excess pressure sensor EJA530A, serial number 91K850383	0,075%	03.09.2012	2 years	Previous verification 07.09.2010
Output of heat energy, grid water after block of heat exchangers				
Averaging pressure tube «TORBAR», serial number 3K240000015675	1%	06.12.2010	2 years	
Temperature transducer TPTU-1-1/142, serial number 9621	0,5	15.10.2010	2 years	
Output of electric energy to external consumers				
Multifunctional three-phase electric energy meters Alpha 1800 (A1802RALXQV-P4GB-DW-4), serial number (electricity transmission line): 01208933 (Kozyrevo-2) 01208935 (Novometallurg.-2)	 0,2S/0,5 0,2S/0,5	 08.07.2010 08.07.2010	 12 years 12 years	

01208931 (Novometallurg.-3)	0,2S/0,5	08.07.2010	12 years	
01208929 (Novometallurg.-4)	0,2S/0,5	08.07.2010	12 years	
01229880 (OV 220 kV)	0,2S/0,5	18.08.2011	12 years	
Multifunctional three-phase electric energy meters EuroALPHA, serial number (electricity transmission line):				
01143198 (Kozyrevo-1)	0,2S/0,5	11.08.2006	8 years	
01143195 (Novometallurg.-1)	0,2S/0,5	11.08.2006	8 years	
The system of automated information-measuring for commercial accounting of electric power (SAIIM CAEP) of power-generating units #2 and #3 of Chelyabinsk CHPP-3	Registered in the State register of measuring instruments under # 47022-11 of 16.06.2011 (Certificate of type approval of measuring RU.E.34.033.A # 42918) Verification certificate of SAIIM CAEP #E-11-49801 of 16.06.2011.			
Automated system of process control				
Program-technical complex “Ovation”	Certificate on approval of type of measurement means #31622 of 31.05.2008. Issued by Federal agency on technical regulation and metrology			

C. Revision of monitoring plan

This monitoring report contains a revision of the monitoring plan presented in section D of PDD, version 7 of November 25, 2010 (on this version of PDD the Bureau Veritas Certification Holding SAS issued a determination report # Russia/0061-2/2010 version 02 of November 25, 2010). The changes have been made to adapt a monitoring plan and represent the actually existing situation according to the “Guidance on criteria for baseline setting and monitoring” (Version 03). All the rest parameters and formulae are in compliance with PDD.

Mentioned in PDD	Implemented in practice	Explanation
<p>Section D. Table D.1.1.1., Table D.1.1.3.</p> <p>The annual monitoring of key parameters of power plant operation is prescribed for:</p> <ul style="list-style-type: none"> - Volume of natural gas consumption, - Output of electricity, - Output of heat energy. 	<p>Monitoring of the key parameters of the project is done monthly. The monitoring report is prepared for July-September 2012.</p>	<p>Preparation of the monitoring report for the mentioned period better corresponds to the needs of the project owner.</p> <p>As soon as a power plant monthly reports on the key parameters used in monitoring the revision of the monitoring plant does not impair its accuracy and applicability.</p> <p>All reporting data (including parameters required for monitoring on the project based on the data sources mentioned in Table B.1.) are entered monthly to the corporate information system SAP of OJSC “Fortum”.</p> <p>This reporting form extract for 3rd quarter signed by the responsible personnel was used for preparation of the considered Monitoring report.</p>

D. Calculation of emission reduction

D.1 Project CO₂ emissions

$$PE_y = FC_{NG,y} * COEF_{NG,y} \quad \text{(formula 1 in PDD)}$$

Where:

PE_y	Project emissions for the period y, tonnes CO ₂
$FC_{NG,y}$	Total amount of fuel consumed by the project power plant for the period y, m ³
$COEF_{NG,y}$	Volumetric coefficient of CO ₂ emission for the natural gas, tonnes CO ₂ /m ³ , calculated as:

$$COEF_{NG,y} = NCV_{NG,y} * EF_{CO2NG} \quad \text{(formula 2 in PDD)}$$

Where:

$NCV_{NG,y}$	Net calorific value of natural gas, GJ/m ³
EF_{CO2NG}	Coefficient of CO ₂ emission for natural gas, tonnes CO ₂ /GJ

D.2 Baseline CO₂ emission

$$BE_y = BE_{grid,y} + BE_{heat,y} \quad \text{(formula 20 in PDD)}$$

Where:

BE_y	Total baseline emissions for the period y, tonnes CO ₂
$BE_{grid,y}$	Baseline CO ₂ emissions from production of electricity in IPS of Urals and Mid Volga, tonnes CO ₂
$BE_{heat,y}$	Baseline CO ₂ emissions from production of heat by new gas fired boilers at the boilers houses of Chelyabinsk city in the baseline, tonnes CO ₂ /year

$$BE_{grid,y} = EG_{PJ,y} * EF_{CO2,grid,y} \quad \text{(formula 21 in PDD)}$$

Where:

$EG_{PJ,y}$	Output of electricity to external consumers from power-generating unit #3 (CCGT) of Chelyabinsk CHPP-3, ths. kWh
$EF_{CO2,grid,y}$	Combined CO ₂ emission factor for grid electricity produced in IPS of Urals and Mid Volga, tonnes CO ₂ /MWh

$$BE_{heat\ y} = HG_{PJ\ y} \cdot EF_{NG} * 4.1868 / \eta_{boiler}$$

(formula 22 in PDD)

Where:

$HG_{PJ\ y}$	Output of heat to external consumers from power-generating unit #3 (CCGT) of Chelyabinsk CHPP-3, Gcal
η_{boiler}	Efficiency of new gas fired boilers at the boilers houses in the baseline, %
EF_{CO2NG}	Coefficient of CO ₂ emission for natural gas, tonnes CO ₂ /GJ;
4.1868	Conversion factor from calories to Joules

D.3 Сокращение выбросов

$$ER_y = BE_y - PE_y$$

(formula 36 in PDD)

Where:

ER_y	Emission reduction for the period y , tonnes CO _{2eq}
BE_y	Baseline emissions for the period y , tonnes CO ₂
PE_y	Project emissions for the period y , tonnes CO ₂

D.4 Tables demonstrating the results of calculation on presented formulae

Data of monthly reporting of Chelyabinsk CHP-3 for 2012

<u>Power-generating unit №3 (CCGT)</u>				<u>Generally for station</u>	
Year 2012	Net output of electricity from bars, ths. kWh	Net output of heat energy, Gcal	Consumption of natural gas, ths. m3	Net calorific value of natural gas, kcal/m3	Net calorific value of natural gas, MJ/m3
July	141 203	0	32 350	7979	33,41
August	138 422	0	31 086	7980	33,41
September	134 887	700	30 230	7993	33,47
Totally	414 512	700	93 666	7984	33,43

Parameters fixed ex-ante in the PDD, version 7 of 25/11/2010

Combined CO2 emission factor for grid electricity to be replaced, ths CO2/MWh	0,5772
Efficiency of new gas fired boilers at the boiler houses in the baseline, %	93,3%
CO2 emission factor for natural gas, tonnes CO2/TJ	56,1

Generation of Emission Reduction Units in 2012

Year 2012	Project emissions from natural gas consumption, tonnes CO _{2eq}	Baseline emissions for electricity, tonnes CO _{2eq}	Baseline emissions for heat, tonnes CO _{2eq}	Total baseline emissions, tonnes CO _{2eq}	Emission Reduction Units generation, tonnes CO _{2eq}
July	60 634	81 502	0	81 502	20 868
August	58 265	79 897	0	79 897	21 632
September	56 762	77 857	176	78 033	21 271
Totally	175 661	239 256	176	239 433	63 772

Annex 1

List of abbreviations

ASPC	Automated System of Process Control
CCGT	Combined-Cycle Gas Turbine
CHPP	Combined Heat and Power Plant
GDP	Gas Distribution Point
GTP	Gas Treatment Point
ERU	Emission Reduction Unit
IPCC	Intergovernmental Panel on Climate Change
LLC	Limited Liability Company
IPS	Integrated Power System
MPE	Maximum Permissible Emission
OJSC	Open Joint-Stock Company
PDD	Project Design Document
SAIIM CAEP	System of Automated Information-Measuring for Commercial Accounting of Electric Power