

# MONITORING REPORT

Version 1.1

01.06.2011

## BIOMASS WASTES TO ENERGY

AT OJSC "ILIM GROUP" BRANCH IN THE TOWN OF BRATSK

Monitoring period: 1.01.2010 – 31.12.2010 (first and last days included)

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## SECTION A. General description of the project activity

### A.1. Title of the project activity and sectoral scope

Title: Biomass wastes to energy at OJSC “Ilim Group” Branch in the town of Bratsk

Sectoral scope<sup>1</sup>: 1. Manufacturing industries (4)

2. Waste handling and disposal (13)

### A.2. Monitoring period

Monitoring period: 1.01.2010 – 31.12.2010 (first and last days included)

### A.3. Brief description of the project activity

The project envisages complex modernization of the energy system of Bratsk Pulp and Paperboard Mill (BPPM) and switching of the boiler equipment to fluidized bed combustion of bark and wood wastes (BWW) and wastewater sludge (WWS).

Project activity starting data – April 2000.

Start of GHG emission reductions generation – June 2001.

The GHG emission reductions during the monitoring period (1.01.2010 – 31.12.2010) amount to 150 827 tCO<sub>2</sub>e.

### A.4. Location of the project activity

The town of Bratsk is a constituent of the Irkutsk Region, located in the central part of Angara Crest on the shore of Bratsk water reservoir, 618 km (by motor road) from Irkutsk (See Fig. A.4.1). The federal roads Tulun–Bratsk–Ust-Kut and Bratsk–Ust-Ilimsk pass through Bratsk. The population is over 250 000 people.

The project activity is implemented on the site of Bratsk Pulp and Paperboard Mill located in the south part of the town (See Fig. A.4.2).

Geographical latitude: 56°07'09"N. Geographical longitude: 101°36'50"E. Time zone: GMT +8:00.



Fig. A.4.1. Location of the town of Bratsk in the Russian Federation

<sup>1</sup> In accordance with the list of sectors approved by JISC [http://ji.unfccc.int/Ref/Documents/List\\_Sectoral\\_Scopes.pdf](http://ji.unfccc.int/Ref/Documents/List_Sectoral_Scopes.pdf)



**Fig. A.4.2. Google Earth map pinpointing the location of the project activity**

#### **A.5. Technical description of the project**

The project envisages complex modernization of the energy system of BPPM in three stages.

The first stage:

- reconstruction of E-75-40K boiler unit No.16 for BWW combustion without residual fuel oil firing (or any other fossil fuel) for fuel stabilization due to implementation of fluidized bed combustion technology. Design, equipment manufacturing, installation supervision and start-up and commissioning were carried out by LLC "Engineering Energy Company "INEKO". Equipment was mounted by LLC "Energomash - Eastern Siberia"

The second stage:

- reconstruction of E-75-40K boiler unit No.14 for BWW combustion without residual fuel oil firing for fuel stabilization with increase of steam output to 90 t/h due to implementation of fluidized bed combustion technology. Design, equipment manufacturing, installation supervision and start-up and commissioning were carried out by LLC "Engineering Energy Company "INEKO". Equipment was mounted by LLC "Energomash - Eastern Siberia".

The third stage:

- installation of a new E-90-3.9-440DFT boiler unit No.15 designed for fluidized bed combustion of BWW and WWS without residual fuel oil firing for fuel stabilization using “Kvaerner Power” technologies (Finland);
- modernization of BWW feed system of renewed utilizing boilers No.14, No.15 and No.16;
- modernization of the thermal flow diagram of THPP.

All works were performed by "LLC "Energotekhnomash".

**A.6. Methodology applied to the project activity (incl. version number)****A.6.1. Baseline methodology**

The developer proposes his own approach [R1] to the baseline setting and GHG emission reductions calculation and does not agree it with any methodologies for the clean development mechanism (CDM), but he certainly makes his approach consistent with the requirements of *Decision 9/CMP.1, Appendix B* [R2].

**A.6.2. Monitoring methodology**

The monitoring plan was developed following our own approach [R1] in accordance with the project specifics and requirements of *Decision 9/CMP.1, Appendix B* [R2] without using any approved CDM methodologies.

**A.7. Name of responsible person(s)/entity(ies)**

CCGS LLC:

- Vladimir Dyachkov, Director of Project Implementation Department  
e-mail: [v.dyachkov@ccgs.ru](mailto:v.dyachkov@ccgs.ru)
- Evgeniy Zhuravskiy, Specialist of Project Implementation Department  
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**SECTION B. Implementation of the project activity****B.1. Implementation status of the project activity****B.1.1. Key dates of the project activity (to accordance with PDD)**

Activity	Date
<u>First stage</u> Reconstruction of E-75-40K boiler unit No.16	April 2000 – June 2001
<u>Second stage</u> Reconstruction of E-75-40K boiler unit No.14	April 2002 – July 2004
<u>Third stage</u> Installation of a new boiler No.15 with, modernization of BWW feed system; modernization of the thermal flow diagram	June 2007 (start of implementation) – March 1, 2010 (completing of construction and installation works)

**B.1.2. The information regarding the actual operation of the project activity during the monitoring period**

1. Construction and installation works on boiler №15 were finished in February 2010 and in March 2010 LLC "TECh-Service" (acting according to the certificate №026-2009-2903000781-C-3) started commissioning tests on the working boiler [R18]. Act of Acceptance of Equipment for Exploitation was signed at the end of commissioning works on June 30, 2010 (Act No.100 of 30.06.2010).
2. On December 20, 2010 the old boiler No.9 was taken out of operation (Order №FB-1618a of 17.12.2010, record the results of the survey in the passport of the boiler).
3. According to PDD pneumatic fuel supply system was stipulated. Actually conveyors were installed. It increased operational reliability of fuel supply system. It was not necessary to change the monitoring plan.
4. The beginning of sludge combustion was postponed at least till 2012. The operation experience showed the necessity of additional modernization of boilers №№14,16 and fuel supply system for sludge combustion. At present this issue is at design stage.

Assembling of outdoor main steamline 1 200 meters long from the boiler house to HPP-2 is postponed for an indefinite time till additional technical and economic assessment is completed.

All moments stated above did not require changing the monitoring plan.

**B.2. Deviations or revisions to the registered monitoring plan**

There are no deviations to the registered monitoring plan.

**SECTION C. Description of the monitoring system****C.1. Organizational scheme of the monitoring**

The Head of Labour Protection and Industrial Safety Department is in charge of the JI project implementation on the part of the Central Office (Order NoGD-120 of 06.07.2010).

Original request for primary GHG emission reductions monitoring data is made by the Director of the Project Implementation Department of CCGS LLC to the Central Office of “Ilim Group” in St.-Petersburg, namely to the Head of Labour Protection and Industrial Safety Department, who in his turn gives instructions to a certain enterprise to collect the requested data (See Fig. C.1.1). Each enterprise that is implementing projects within the framework of the Kyoto Protocol has specific persons (a working group) that responsible for collection, control and transfer of monitoring data. The responsibility of these persons is specified in corresponding orders. At “Ilim” Group Branch in Bratsk the responsibility of such persons are set forth in Order No FB/524 of 29 .12. 2007, No FB/1028 of 24 .11.2009 and № GD21 of 04.02.2011.

All primary data are collected in accordance with the Mill’s practice of fuel, energy and resources monitoring. Monitoring does not require any changes in the existing system of information collection and recording. All necessary data are determined and registered in any case.

Primary data is arrives to the Director for Labour Protection, Industrial, Environment and Fire Safety from the Lead Engineer of the Technological Heat and Power Plant. The Director for Labour Protection, Industrial, Environment and Fire Safety transfers it to the Central Office, namely to the Head of the Labour Protection and Industrial Safety Department, who in his turn transfers it to the Director of the Project Implementation Department of CCGS LLC. All information is transferred by e-mail.

On the basis of the received data the Department of Project Implementation of CCGS LLC prepares a GHG emission reduction monitoring report and submits it for additional cross-check to the Project Development Department of CCGS LLC. As soon as all comments made by the Project Development Department are incorporated or resolved the monitoring report is submitted for verification to the enterprise where the project is implemented.

At CCGS LLC the procedure for verification of the monitoring reports are laid down in “Regulations on quality check and control of GHG emission reduction project design documents (PDD) and monitoring reports at CCGS LLC” (See Annex 1).

After the report is verified and amended as necessary, the Director of the Project Implementation Department of CCGS LLC informs the Head of the Labour Protection and Industrial Safety Department of “Ilim” Group’s Central Office in St.-Petersburg about preliminary monitoring results and, if there are no comments on his part, the General Director of CCGS LLC takes the final decision to submit the monitoring report for verification to an independent expert organization.

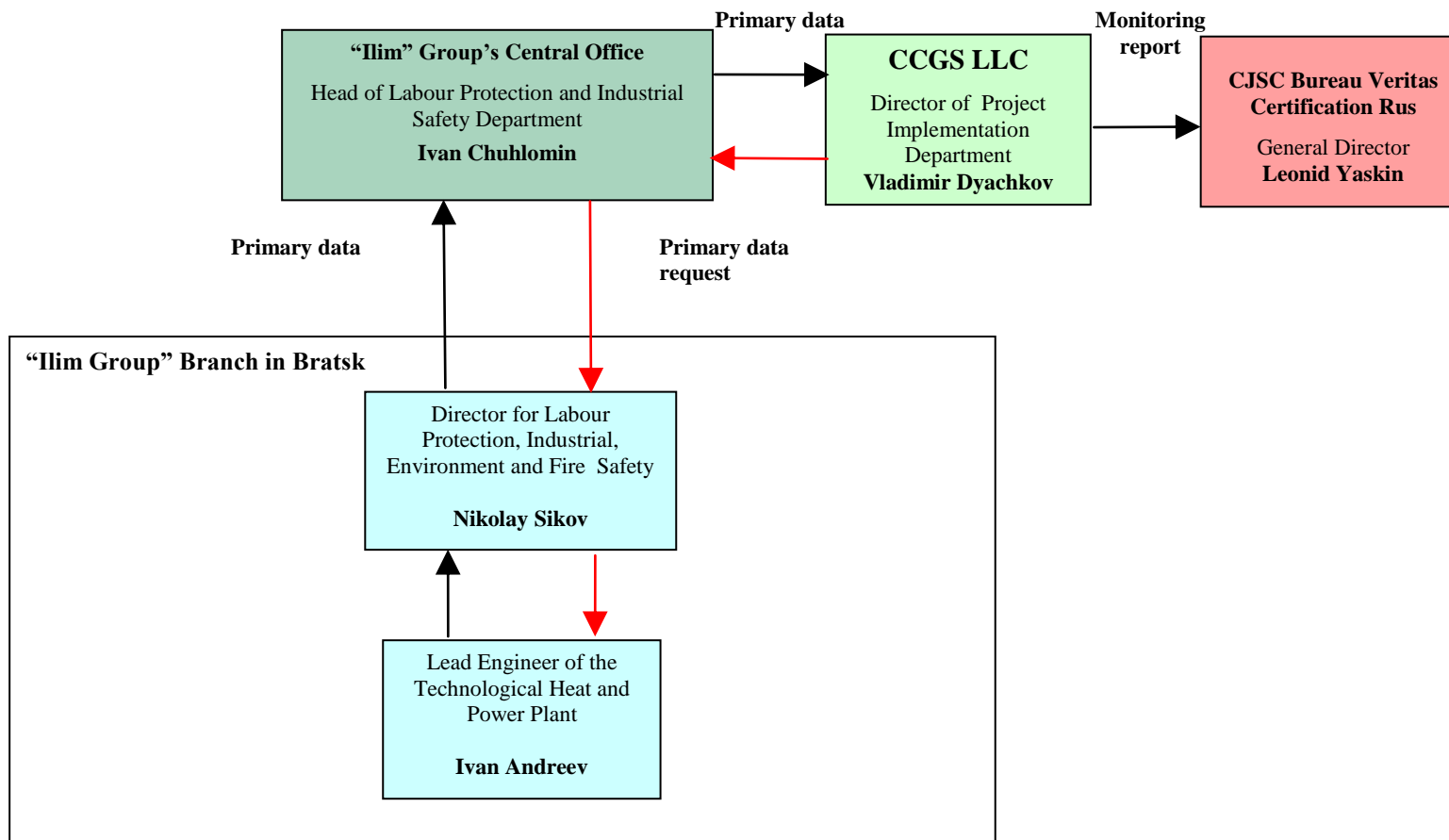


Fig. C.1.1. Information transfer scheme (from primary data to monitoring report)

**C.2. Roles and responsibilities of personnel**

The management of “Ilim” Group’s Central Office in Saint-Petersburg is responsible for project implementation (Head of Labour Protection and Industrial Safety Department, Order NoGD-120 of 06.07.2010).

The management of OJSC “Ilim Group” Branch in Bratsk is responsible for:

- normal operation of the equipment;
- promptness and fullness of the primary data collection, organization of primary monitoring data verification and data transfer to the Labour Protection and Industrial Safety Department of the Central Office and resolution of other organizational issues related to monitoring (Director for Labour Protection, Industrial, Environment and Fire Safety);
- collection, check-out and archiving of the primary data for monitoring (Lead Engineer of the Technological Heat and Power Plant);
- timely calibration of metering devices necessary for carrying out of monitoring (Chief Metrologist);
- check-out of the monitoring report (Chief Power Engineer);
- arranging and holding training sessions for the Mill’s personnel regarding collection of data required for the GHG emissions monitoring under the project (Director for Labour Protection, Industrial, Environment and Fire Safety).

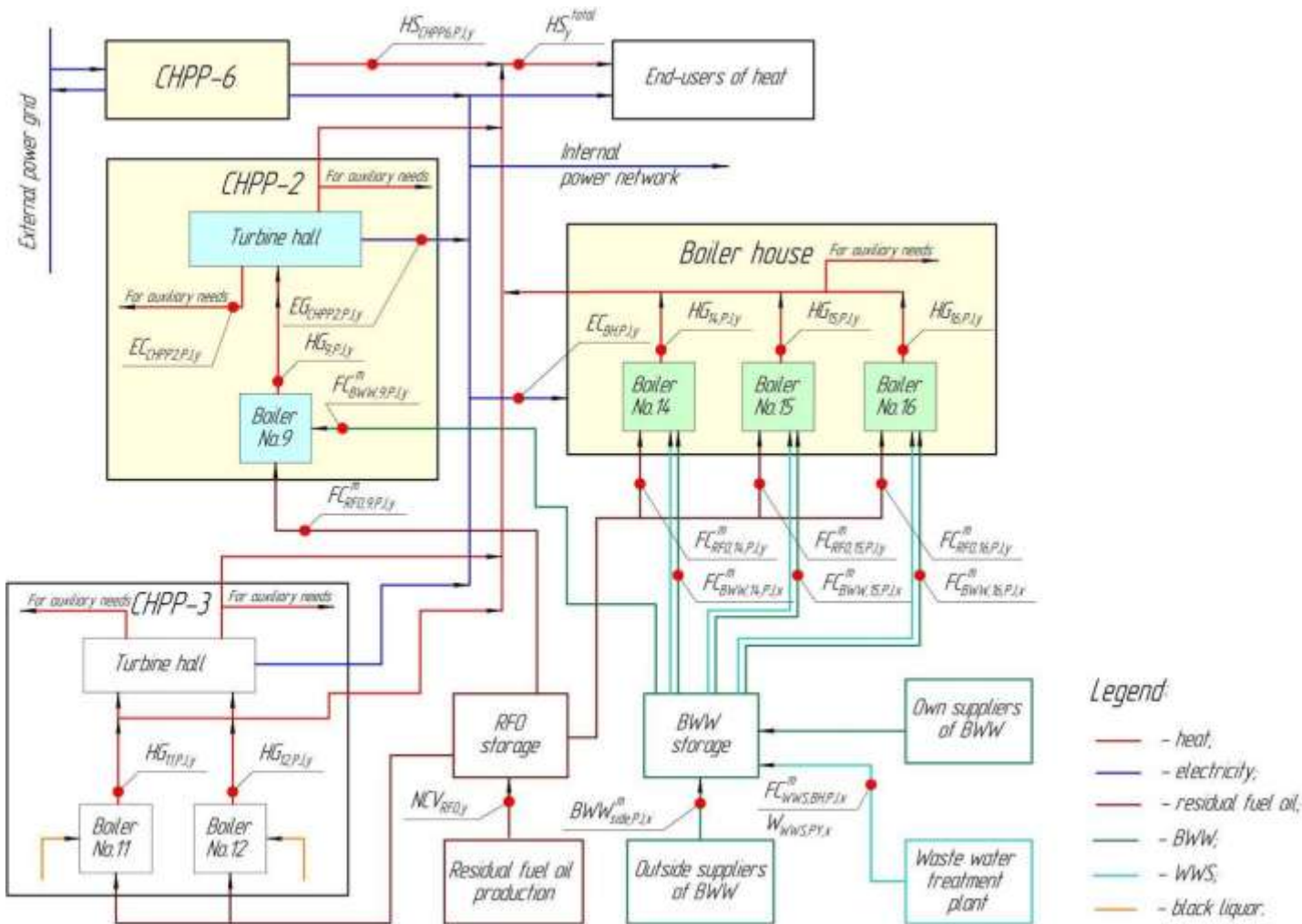
The responsibility of such persons are set forth in Order № GD-21 of 04.02.2011.

The management of CCGS LLC is responsible for:

- drawing up of the monitoring report (Director of Project Implementation Department);
- interaction with the independent expert organization concerning verification of GHG emissions reductions (Director of Project Implementation Department);
- arranging and holding training sessions for the Mill’s personnel regarding collection of data required for the GHG emissions monitoring under the project (Director of Project Implementation Department).

**C.3. Location of the monitoring points**

HG	Heat generation
HS	Heat supply
ES	Electricity supply
EC	Electricity consumption
FC	Fuel consumption
NVC	Net calorific value
W	Moisture
BWW	Bark and wood wastes
WWS	Wastewater sludge



**Legend:**

- heat,
- electricity,
- residual fuel oil,
- BWW,
- WWS,
- black liquor.

#### **C.4. Procedures for management of monitoring and measuring devices**

The enterprise is certificated with the international standard ISO 9001 «Quality management systems».

This standard sets out monitoring and measuring devices control procedures, namely:

- procedures for procurement of measuring devices;
- procedures for stock record, operation, repair and identification;
- operational procedure in case of identification of non-compliance of the measuring devices;
- persons responsible for operation of measuring devices and for monitoring of compliance with the monitoring and measuring devices control procedures.

According to procedures of this standard, if any non-compliance of the measuring processes with the standards specified in design documentation is identified, the situation is analyzed, alternative monitoring and measuring procedures are developed for the period of non-compliance as well as corrective actions are taken that allow to remedy any identified non-compliance.

Measuring devices used for monitoring correspond to the legislation of Russian Federation on uniformity of measurements (Federal law №102-FZ "On uniformity of measurements" of 26.06.2008) are subject to regular metrological validation of serviceability (verification).

The instrumentation calibration and check-out have been carried out by contracted specialized organizations licensed for this type of activity in accordance with the Federal law №102-FZ " On uniformity of measurements ". The required verification and/or calibration of all measuring devices is carried out in accordance with the schedule developed by the Department of Chief Metrologist. The Chief Metrologist of OJSC "Ilim Group" Branch in Bratsk is responsible for verification and calibration of all measuring devices.

The measuring instruments have been calibrated during scheduled shutdowns of the equipment. If necessary, the removed measuring instrument is replaced with a gaged back-up instrument. Operation of the equipment without measuring instruments is not allowed.

**C.5. Data on metering devices**

The measuring devices used for monitoring are corresponding to such documents as “Electricity Metering Rules”, “Heat Metering Rules” etc. The devices have undergone regular inspection and supervision under the Federal Law №102-FZ “On Uniformity of Measurements”. LLC “Avtomatika-Servis” carries out checking (calibration) of measuring devices.

Table C.5.1. shows metrological performance of the measuring devices used for monitoring.

**Table C.5.1. Data on metering devices for GHG emission reduction monitoring**

Metered parameter	Mark and type of meter		Serial number	Measurement range	Unit	Error, accuracy class	Calibration interval (month)	Last calibration data
Mass consumption of residual fuel oil in boiler No.9 under the project during the year y	Flow meter (Supply line)	Metran-43DD	60023	0.1	kgf/cm <sup>2</sup>	0.5	24	01.10.2010
	Flow meter (Return line)	Metran-43DD	60022	0.1	kgf/cm <sup>2</sup>	0.5	24	01.10.2010
Mass consumption of residual fuel oil in boiler No.14 under the project during the year y	Flow meter (Supply line)	Micro-Motion F100S-131SBFZHZZZZ	532382 / m.3704516	8	m <sup>3</sup> /h	1	24	03.11.2010
	Flow meter (Return line)	Micro-Motion F100S-131SBFZHZZZZ	532308 / m.3703534	8	m <sup>3</sup> /h	1	24	03.11.2010
Mass consumption of residual fuel oil in boiler No.15 under the project during the year y	Flow meter (Supply line)	Promass 80F40-AD6SAADAAAAA	C60C9502000	4500	kg/h	0.15	48	15.06.2009
	Flow meter (Return line)	Promass 80F40-AD6SAADAAAAA	C60C9602000	4500	kg/h	0.15	48	15.06.2009
Mass consumption of residual fuel oil in boiler No.16 under the project during the year y	Flow meter (Supply line)	M-Point/PROCOM11ZL	R1230795 / 230795	10	m <sup>3</sup> /h	1	24	15.08.2009
	Flow meter (Return line)	Promass 80F25-AD2SAAB1AEAA	C40F1502000	10	m <sup>3</sup> /h	0.15	48	06.05.2009
Calorific value of residual fuel oil over the year y	Calorimetric bomb	V-08-MA	060	-	J/kg	0.10%	12	15.02.2010

Metered parameter	Mark and type of meter		Serial number	Measurement range	Unit	Error, accuracy class	Calibration interval (month)	Last calibration data
	Weighs	VR-2218	306030678	0-220	g	high	12	15.06.2010
	Set of weighs	G-2-210	955	1-210	g	F1	12	15.09.2010
Heat generation by boiler No.9 under the project during the year y	Flow meter	EH-61007	25904	1	kgf/cm <sup>2</sup>	0.5	24	15.06.2009
	Pressure meter	Metran-43DI	L5467	0-60	kgf/cm <sup>2</sup>	0.5	24	15.04.2009
		KSU-1	600102	0-60	kgf/cm <sup>2</sup>	1.5	12	14.01.2010
	Temperature gage	THK, KSP-1	805003	0-600	°C	1.5	12	01.10.2010
Heat generation by boiler No.14 under the project during the year y	Flow meter	Metran-22-DD-2450	5932	250	kPa	0.5	36	15.05.2009
	Pressure meter	Metran-22DI	5716	0-60	kgf/cm <sup>2</sup>	0.5	24	15.05.2009
	Temperature gage	THA, IPM0399/M3	12-1437	0-1000	°C	0.5	24	15.11.2009
Heat generation by boiler No.15 under the project during the year y	Flow meter	Metran -150 CD3	875991	160	kPa	0.5	36	15.10.2009
	Pressure meter	Metran -150 CG5	875513	0-6	MPa	0.5	36	15.10.2009
	Temperature gage	THA, IPM0399/M3	12-1773	0-1000	°C	0.5	24	15.11.2009
Mass consumption of residual fuel oil in boiler No.16 under the project during the year y	Flow meter	Metran -100DD	823386	250	kPa	0.5	36	15.11.2008
	Pressure meter	Sapfir-22DI	502141	0-60	kgf/cm <sup>2</sup>	0.5	24	15.10.2010
	Temperature gage	THA, IPM0399/M2	11-5139	0-1000	°C	0.5	24	15.12.2010
Heat generation by boiler No.11 under the project during the year y	Flow meter	Diff -E1	850589	1.53	kgf/cm <sup>2</sup>	0.5	24	15.05.2010
	Pressure meter	Press-E1	800837	0-50	kgf/cm <sup>2</sup>	0.5	24	15.05.2010
	Temperature gage	thermocouple NiCr-Ni*	-	0-500	°C	-	-	Calibration is not required

Metered parameter	Mark and type of meter		Serial number	Measurement range	Unit	Error, accuracy class	Calibration interval (month)	Last calibration data
Heat generation by boiler No.12 under the project during the year y	Flow meter	Diff-El	652510	1.53	kgf/cm <sup>2</sup>	0.5	24	15.05.2009
	Pressure meter	Press-El	601055	0-50	kgf/cm <sup>2</sup>	0.5	24	15.05.2009
	Temperature gage	thermocouple NiCr-Ni*	-	0-500	°C	-	-	Calibration is not required
Total heat supply (in the form of steam) to end-users from THPP and CHPP-6 during the year y	Flow meter	Metran-100DD	153081	0.4	kgf/cm <sup>2</sup>	0.5	36	15.04.2010
	Pressure meter	Metran-43DI	L6697	0-25	kgf/cm <sup>2</sup>	0.5	24	15.04.2010
	Temperature gage	THK, KSP-1	803622	0-400	°C	0.05/1.5	12	15.11.2010
Heat supply (in the form of steam) to end-users from CHPP-6 under the project during the year y	Flow meter	Metran-100DD	153085	0.63	kgf/cm <sup>2</sup>	0.5	24	15.03.2010
	Pressure meter	Sapfir-22DI	156845	0-25	kgf/cm <sup>2</sup>	0.5	24	15.02.2010
	Temperature gage	TSP-100II avtolog*	-	0-400	°C	-	-	Calibration is not required
Electricity generation at CHPP-2 under the project during the year y	Electric meter	SAZU I 670m	909998	-	kWh	2	48	15.03.2007
Electricity consumption for auxiliary needs of CHPP-2 under the project during the year y	Electric meter	SAZU I 670m	707874	-	kWh	2	48	I quarter 2008
Electricity consumption for auxiliary needs of boiler house under the project during the year y	Electric meter	SAZU I 670m	575043	-	kWh	2	48	07.04.2011

\* These temperature gages do not have construction setup option (scheduled calibration is not required); they either work within the given range with installed metrological parameters or do not work and need to be replaced by temperature gages in good order.

**C.6. Procedures of collection of the primary data**

Collection and record of data required for calculation of GHG emission reductions have been carried out in accordance with the Sector C.3.

The project envisages reconstruction of the boiler house with installation of a central boiler control panel and connection of the boilers to the automatic process control system of the Mill. APCS of the Mill ensures automated primary data collection and processing. Readings of heat and electricity meters and residual fuel oil flow meters have been transferred to the control units for further processing and archiving.

1. Mass residual fuel oil consumption in the utilizing boilers under the project during the year  $y$  has been determined based on readings of residual fuel oil flow meters. Readings of flow meters are cross-checked with readings of level gages in the residual fuel oil storage tank. Mass residual fuel oil consumption in boilers No.9, No.14, No.15 and No.16 under the project during the year  $y$  (See Table E.1, ID 1-4) has been determined based on readings of the residual fuel oil meters, installed at the forward and return residual fuel oil feeding lines of the boilers.
2. The analysis of net calorific value of residual fuel oil has been conducted on a weekly basis by THPP laboratory. The results of the laboratory analysis have been cross-checked with the fuel suppliers' certificates. Average net calorific value of residual fuel oil in the year  $y$  (See Table E.1, ID 5) has been determined as an average value at the end of the year  $y$ .
3. Heat generation by THPP boilers under the project during the year  $y$  (See Table E.2, ID 6-9, 12-13) has been determined based on reading of the heat meters installed at each boiler. Heat generation data have been regularly transferred to control units and archived.
4. Total heat supply (in the form of steam) to end-users from THPP and CHPP-6 during the year  $y$  (See Table E.2, ID 10) and heat supply (in the form of steam) to end-users from CHPP-6 under the project during the year  $y$  (See Table E.2, ID 11) have been determined on the basis of readings of heat meters installed at THPP, CHPP-6, and on the demand side. Heat supply data has been collected on a weekly basis and archived.
5. Electricity generation at CHPP-2 under the project during the year  $y$  (See Table E.2, ID 14) and electricity consumption for auxiliary needs of CHPP-2 under the project during the year  $y$  (See Table E.2, ID 15) have been determined on the basis of readings of electricity meters installed at CHPP-2. Electricity generation data and data on electricity consumption for auxiliary needs of CHPP-2 have been regularly transferred to the control unit and archived.
6. Electricity consumption for auxiliary needs of the boiler house under the project during the year  $y$  (See Table E.2, ID 16) has been determined on the basis of readings of electricity meters installed in the boiler house. Data on electricity consumption for auxiliary needs of the boiler house has been regularly transferred to the control unit and archived.
7. Mass BWW consumption in boiler No.9 under the project during the year  $x$  (See Table E.2, ID 17) has been determined using the calculating algorithm. Mass BWW consumption in boilers No.14, No.15 and No.16 under the project during the year  $x$  (See Table E.2, ID 18-20) has been determined by the automation system as per the preset algorithm. BWW combustion data has been regularly transferred to the control unit and archived.
8. The quantity of BWW supplied (for combustion) from outside companies has been determined at the special handling and metering point based on the number of vehicles passing through it. Data on the quantity of supplied BWW has been cross-checked with waybills, bills of lading, contracts and delivery certificates. The quantity of BWW supplied to BPPM (for combustion) from outside companies under the project during the year  $x$  (See Table E.2, ID 21) has been determined as a sum of mass BWW quantities supplied during the year  $x$ .

9. Mass WWS consumption in the boiler house under the project during the year  $x$  (See Table E.2, ID 22) has been determined at the special handling and metering point based on the number of vehicles passing through it.
10. The analysis of WWS has been conducted on a daily basis by THPP laboratory. Average moisture content of WWS under the project in the year  $x$  (See Table E.2, ID 23) has been determined as an average value at the end of the year  $x$ .

The data sources for calculation of GHG emission reductions in the course of the monitoring during the year have been: internal data of THPP, statistical report form No.6-TP “Thermal power plant performance data”, “Report on heat utilization by product type”, “Wood wastes generation and utilization balance of Bratsk industrial site”.

### **C.7. Data storage**

The maintenance personnel of THPP and chips production are responsible for daily data collection and archiving according to the internal rules and regulations.

Every day shift fitters of instrumentation and automation department (of CHPP-2, CHPP-3 and the boiler house) printed out readings of daily heat generation meters, heat supply meters and fuel flow meters recorded in the APCS and submitted these data to the production and technical department (PTD). Shift electricians (of CHPP-2 and the boiler house) took readings of electricity meters and entered those into the logs. The logs have been submitted to the PTD.

Specialists of THPP laboratory entered into reports the results of the analysis of residual fuel oil NCV (every week). The reports have been submitted to the PTD.

Specialists of the chips production have kept daily operating logs, in which they recorded on a daily basis the data on quantity of BWW supplied from outside companies, and on quantity of WWS fired in the boiler house. The daily operating logs have been submitted to the PTD.

Energy resources monitoring engineer of the PTD has summarized the provided data (some data was taken from the plant’s overall energy monitoring system APCS), filled in the logs and drawn up reports. The reports have been submitted to the department of the chief energy engineer, accounting department and economics department.

The data to be monitored and required for determination according to parag.37 of Decision 9/CMP.1 will be stored for at least 2 years after the last ERU transfer under the project. The data has been archived in paper and electronic form. The person responsible for data collection and storage is the Leading Engineer of the Technological Heat and Power Plant.

The sources of primary data are shown in Table C.7.1.

**Table C.7.1. The sources of primary data**

Primary data	Document where the parameter is recorded
Mass residual fuel oil consumption in boiler No.9 under the project during the year y	"Reference for combustion of main and backup fuel at THPP"
Mass residual fuel oil consumption in boiler No.14 under the project during the year y	
Mass residual fuel oil consumption in boiler No.15 under the project during the year y	
Mass residual fuel oil consumption in boiler No.16 under the project during the year y	
Mass BWW consumption in boiler No.9 under the project during the year y	
Mass BWW consumption in boiler No.14 under the project during the year y	
Mass BWW consumption in boiler No.15 under the project during the year y	
Mass BWW consumption in boiler No.16 under the project during the year y	
Quantity of BWW supplied to BPPM (for combustion) from outside companies under the project during the year y	"Balance of wood wastes and bark generation and utilization at Bratsk Production Site"
Heat generation by boiler No.9 under the project during the year y	"Annex to the Energy Resources Report"
Heat generation by boiler No.11 under the project during the year y	
Heat generation by boiler No.12 under the project during the year y	
Heat generation by boiler No.14 under the project during the year y	
Heat generation by boiler No.15 under the project during the year y	
Heat generation by boiler No.16 under the project during the year y	
Electricity generation at CHPP-2 under the project during the year y	"Daily Records of Electric Meter Readings 6kVMain Switchgear of CHPP-2"
Electricity consumption for auxiliary needs of CHPP-2 under the project during the year y	
Electricity consumption for auxiliary needs of the boiler house under the project during the year y	"Energy Resources Distribution Report"
Average net calorific value of residual fuel oil in the year y	Form 6-TP
Heat supply (in the form of steam) to end-users from THPP under the project during the year y	
Heat supply (in the form of steam) to end-users from CHPP-6 under the project during the year y	" Purchased Heat and Electricity Distribution Report"

### **C.8. Involvement of Third Parties**

The LLC "Avtomatika-Servis" is the Third Party involved.

### **C.9. Quality control and quality assurance procedures undertaken for monitoring**

OJSC “Ilim Group” Branch in Bratsk is certificated with the international standard ISO 9001 “Quality management systems” and is governed by the requirements of these standards in its operations.

<b>C.9.1. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored</b>		
<i>Data (Indicate table and ID number)</i>	<i>Uncertainty level of data (high/medium/low)</i>	<i>QA/QC procedures planned for these data</i>
Table E.1. ID 1-4	low	Residual fuel oil flow meters are regularly calibrated. Readings of the flow meters are cross-checked with readings of level gages in the residual fuel oil storage tank.
Table E.1. ID 5	low	Laboratory equipment is regularly calibrated. Results of laboratory analysis are cross-checked with the fuel supplier’s certificates.
Table E.2. ID 6-13	low	Heat meters are regularly calibrated; readings are cross-checked with balance data.
Table E.2. ID 14-16	low	Electricity meters are regularly calibrated.
Table E.2. ID 17-20	low	The algorithm for calculation of BWW consumption is constantly updated based on boiler performance data.
Table E.2. ID 21	low	The BWW transportation vehicles undergo control weighing every six months. Arrival of each vehicle is recorded in an operating log at the handling and metering point. If any doubts arise as to the compliance of the vehicle loading with the data indicated in the transportation documents (waybills, bills of landing, contracts and delivery certificates for BWW), the personnel of the handling and metering point take check measurement of the BWW volume in this vehicle.
Table E.2. ID 22	low	The WWS transportation vehicles undergo control weighing every six months. Arrival of each vehicle is recorded in an operating log at the handling and metering point. If any doubts arise as to the compliance of the vehicle loading with the data indicated in the transportation documents, the personnel of the handling and metering point take check measurement of the WWS volume in this vehicle.

### **C.9.2. Internal check-out**

Ivan Chukhlomin, the Head of Labour Protection and Industrial Safety Department, is in charge of the JI project implementation on the part of the Central Office (Order NoGD-120 of 06.07.2010). The project implementation process is checked and reviewed at the level of the Central Office and Branch Offices two times per year. The checks and reviews are to be based on the data and recommendations provided by CCGS LLC. The first review is to be carried out in May-June based on the results of emission reductions verification, the second review is to be held in October based on the data obtained in the course of training and preliminary estimation of emission reductions in January-September. Based on the results of such checks and reviews recommendations are developed as to how to improve the monitoring plan and to maximize emission reductions.

The responsibility for timely and full collection of primary data, organization of internal check-out of primary data and monitoring reports and for dealing with other organizational issues related to monitoring lies with the following person:

- The Director for Labour Protection, Industrial, Environment and Fire Safety of the OJSC “Ilim Group” Branch in the town of Bratsk, N. Sikov.

The responsibility for collection, check-out and transfer of primary data for monitoring lies with the following person:

- The Lead Engineer of the Technological Heat and Power Plant, I. Andreev.

The responsibility for timely calibration of metering devices necessary for carrying out of monitoring lies with the following person:

- The Chief Metrologist, V. Nikonov.

The responsibility for check-out of monitoring report lies with the following person:

- The Chief Power Engineer, A. Jankauskas.

The internal check-out of monitoring report at “Ilim Group” Branch in Bratsk was carried out by the Chief Power Engineer, Andrey Jankauskas. Act of internal audit was made on results of check-out of the MR 2010 (Act No.3 of 29.03.2011).

The responsibility of these persons is specified in Order № GD-21 of 04.02.2011.

At least once per year the company carries out an internal audit of observance of monitoring procedures under the direction of the Director for Labour Protection, Industrial, Environment and Fire Safety. In 2010 such check was carried out April 7. Specialists of the CCGS LLC took part in this check. Act of internal audit was made on results of check-out of the monitoring report (Act No.1 of 12.04.2010).

### **C.9.3. Cross-check**

Primary data are verified by cross checking different sources where these data are recorded.

Check of the monitoring report is carried out by employees of the OJSC “Ilim Group” Branch in the town of Bratsk and employees of the CCGS LLC.

Within CCGS the monitoring report is verified by the Director of the Project Implementation Department of CCGS LLC or, on his instructions, by other specialist of the said Department who is not directly related to preparation of this report. The additional cross-check is made by the Director of the Project Preparation Department of CCGS LLC or, on his instructions, by other specialist of this Department. The quality control procedures are laid out in detail in the “The provisions for quality control procedure in relation to preparation of project design documents and monitoring reports for greenhouse gas emission reduction projects at CCGS LLC” (See Annex 1).

### **C.9.4. Trainings**

The THPP personnel whose work was connected with operation of the reconstructed boilers underwent training organized by the equipment manufacturer. All maintenance personnel have the required qualification and valid permits to operate THPP’s main equipment. New employees and personnel who need to confirm their admission group are required to undergo respective training, pass a test and obtain a permission certificate in accordance with the Federal law “On industrial safety of hazardous facilities”. The person responsible for the personnel training is Director for Labour Protection, Industrial, Environmental and Fire Safety. His responsibilities include:

1. Receipt of training applications.
2. Drawing up training schedules.

3. Concluding contracts for training and submission to the accounting department for payment.
4. Control over training documents.

Minimum once a year, CCGS LLC together with a management of the OJSC “Ilim Group” carry out check for the personal regarding collection, check-out, archiving and transferring of the primary data. In 2010 such check was carried out October 12-25 (Act No.2 of 26.10.2010).

The Monitoring Guidelines which describe in detail actions of each member of the working group have been approved and are in effect within the company.

#### **C.10. Monitoring procedures in case of emergency situations**

In case of any emergency situations at the company which affect the project monitoring system (breakdown of equipment, failure of measuring devices) specialists of OJSC “Ilim Group” and CCGS LLC shall analyze the situation and elaborate alternative monitoring and measurement schemes for the duration of such circumstances as well as corrective actions covering the monitoring equipment and/or monitoring plan.

In case of any breakdown of the utilizing boilers, heat and electricity generation goes down, whereas heat supply from CHPP-6 and electricity consumption from the power grid increases. If the process of BWW and WWS combustion in the boilers becomes less stable, additional consumption of residual fuel oil increases. Any variation of fuel consumption in the utilizing boilers or reduction of heat and electricity supply as a result of emergency situations is automatically recorded by the meters.

All incidents that take place at the Mill are recorded by the Department of the Chief Energy Engineer and by the Technical Supervision Service of the Health, Environment and Safety Department in the prescribed order.

#### **C.11. The environmental service**

The enterprise is certified for compliance with the international system of ecological management ISO 14001 and the requirements of the Forest Stewardship Council (FSC).

The enterprise has an Environmental Control and Management Department. The work of the department is guided by the current law, orders and decrees of the general director, and instructions of the state environmental control service, the committee for natural resources of the Irkutsk Region. The department employs qualified staff and is able to ensure proper industrial environmental monitoring under the project.

The department is responsible for monitoring of:

- emission of pollutants into the atmosphere;
- wastewater quality;
- utilization, stockpiling, transportation and disposal of industrial wastes.

During the project implementation the analytical monitoring of various environmental impacts has been carried out in accordance with the existing rules and schedule. The data obtained by the analytical laboratory has been processed and summarized in monthly and annual reports which contain all required detailed information including data by production sites covered by this project.

**SECTION D. Influence estimation on environment**

The project helps to reduce coal combustion at CHPP-6. It results in lower emissions of both greenhouse gases and The calculations were made in accordance with RD 34.02.305-98 “The Methodology for Calculation of Gross Pollutant Emissions from TPP Boilers” [R9], issued by VTI.

As a result of the project the coal consumption at CHPP-6 in year 2010 reduces by an average of 45 thousand tonnes. The emissions of sulfur dioxide reduce by 324 t, carbon oxide – by 146 t, nitrogen oxides (calculated as nitrogen dioxide) – by 151 t, and suspended particles – by 273 t. The overall reduction of gross pollutant emissions to the atmosphere amounts to 894 t.

**Table D.1. Variation of pollutant emissions at CHPP-6, t**

Pollutant emissions	Value
Suspended particles	-273
Sulfur dioxide (SO <sub>2</sub> )	-324
Nitrogen oxides calculated as nitrogen dioxide (NO <sub>2</sub> )	-151
Carbon oxide (CO)	-146
<b>Total emissions</b>	<b>-894</b>

**SECTION E. Data and parameters****E.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived**

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data archived? (electronic/ paper)	Numerical value
1. $FC_{RFO,9,PJ,y}^m$	Mass residual fuel oil consumption in boiler No.9 under the project during the year y	The Mill's energy service	t	m	Continuously	100 %	Electronic and paper	3 091
2. $FC_{RFO,14,PJ,y}^m$	Mass residual fuel oil consumption in boiler No.14 under the project during the year y	The Mill's energy service	t	m	Continuously	100 %	Electronic and paper	4 062
3. $FC_{RFO,15,PJ,y}^m$	Mass residual fuel oil consumption in boiler No.15 under the project during the year y	The Mill's energy service	t	m	Continuously	100 %	Electronic and paper	719
4. $FC_{RFO,16,PJ,y}^m$	Mass residual fuel oil consumption in boiler No.16 under the project during the year y	The Mill's energy service	t	m	Continuously	100 %	Electronic and paper	5 223
5. $NCV_{RFO,y}$	Average net calorific value of residual fuel oil in the year y	The Mill's energy service	GJ/t	m	Once per week	100 %	Electronic and paper	39.80

<b>E.2. Data to be collected in order to monitor emissions from the baseline, and how these data will be archived</b>								
ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data archived? (electronic/ paper)	Numerical value
6. $HG_{9,PJ,y}$	Heat generation by boiler No.9 under the project during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	796 970
7. $HG_{14,PJ,y}$	Heat generation by boiler No.14 under the project during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	1 043 652
8. $HG_{15,PJ,y}$	Heat generation by boiler No.15 under the project during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	1 274 447
9. $HG_{16,PJ,y}$	Heat generation by boiler No.16 under the project during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	854 265
10. $HS_y^{total}$	Total heat supply (in the form of steam) to end-users from THPP and CHPP-6 during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	18 540 647
11. $HS_{CHPP6,PJ,y}$	Heat supply (in the form of steam) to end-users from CHPP-6 under the project during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	9 024 815
12. $HG_{11,y}$	Heat generation by boiler No.11 during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	5 079 455
13. $HG_{12,y}$	Heat generation by boiler No.12 during the year $y$	The Mill's energy service	GJ	m, c	Continuously	100 %	Electronic and paper	5 191 943
14. $EG_{CHPP2,PJ,y}$	Electricity generation at CHPP-2 under the project during the year $y$	The Mill's energy service	MWh	m	Continuously	100 %	Electronic and paper	33 103
15. $EC_{CHPP2,PJ,y}$	Electricity consumption for auxiliary needs of CHPP-2 under the project during the year $y$	The Mill's energy service	MWh	m	Continuously	100 %	Electronic and paper	16 514

16. $EC_{BH,PJ,y}$	Electricity consumption for auxiliary needs of the boiler house under the project during the year $y$	The Mill's energy service	MWh	m	Continuously	100 %	Electronic and paper	30 570
17. $FC_{BWW,9,PJ,y}^m$	Mass BWW consumption in boiler No.9 under the project during the year $x$	The Mill's energy service	t	c	Continuously	100 %	Electronic and paper	126 987
18. $FC_{BWW,14,PJ,y}^m$	Mass BWW consumption in boiler No.14 under the project during the year $x$	The Mill's energy service	t	c	Continuously	100 %	Electronic and paper	155 525
19. $FC_{BWW,15,PJ,y}^m$	Mass BWW consumption in boiler No.15 under the project during the year $x$	The Mill's energy service	t	c	Continuously	100 %	Electronic and paper	224 227
20. $FC_{BWW,16,PJ,y}^m$	Mass BWW consumption in boiler No.16 under the project during the year $x$	The Mill's energy service	t	c	Continuously	100 %	Electronic and paper	120 156
21. $BWW_{side,PJ,y}^m$	Quantity of BWW supplied to BPPM (for combustion) from outside companies under the project during the year $x$	The Mill's energy service	t	m	As BWW is supplied	100 %	Electronic and paper	86 721
22. $FC_{WWS,BH,PJ,y}^m$	Mass WWS consumption in the boiler house under the project during the year $x$	The Mill's energy service	t	m	With each batch of WWS	100 %	Electronic and paper	_*
23. $W_{WWS,PJ,y}$	Average moisture content of WWS under the project in the year $x$	The Mill's energy service	%	m	Daily	100 %	Electronic and paper	_*

\* In 2010 WWS was not burned.

### E.3. Data to be collected in order to monitor the leakage, and how these data will be archived

The leakages are absent.

## SECTION F. Emission reductions calculation

### F.1. Project emissions calculation

The project GHG emissions during the year  $y$ , t CO<sub>2</sub>e:

$$PE_y = PE_{RFO,y},$$

where  $PE_{RFO,y}$  is the project emissions of CO<sub>2</sub> from combustion of residual fuel oil in the utilizing boilers during the year  $y$ , t CO<sub>2</sub>e;

$$PE_{RFO,y} = FC_{RFO,PJ,y}^m \times NCV_{RFO,y} \times EF_{CO_2,RFO},$$

where  $FC_{RFO,PJ,y}^m$  is the mass residual fuel oil consumption in the utilizing boilers under the project during the year  $y$ , t;

$$FC_{RFO,PJ,y}^m = FC_{RFO,9,PJ,y}^m + FC_{RFO,14,PJ,y}^m + FC_{RFO,15,PJ,y}^m + FC_{RFO,16,PJ,y}^m,$$

where  $FC_{RFO,9,PJ,y}^m$  is the mass residual fuel oil consumption in boiler No.9 under the project during the year  $y$ , t;

$FC_{RFO,14,PJ,y}^m$  is the mass residual fuel oil consumption in boiler No.14 under the project during the year  $y$ , t;

$FC_{RFO,15,PJ,y}^m$  is the mass residual fuel oil consumption in boiler No.15 under the project during the year  $y$ , t;

$FC_{RFO,16,PJ,y}^m$  is the mass residual fuel oil consumption in boiler No.16 under the project during the year  $y$ , t.

$NCV_{RFO,y}$  is the average net calorific value of residual fuel oil in the year  $y$ , GJ/t;

$EF_{CO_2,RFO}$  is the CO<sub>2</sub> emission factor for residual fuel oil combustion, t CO<sub>2</sub>e/GJ. According to 2006 IPCC Guidelines for National Greenhouse Gas Inventories [R6] for the entire project period is assumed as follows:  $EF_{CO_2,RFO} = 0.0774$  t CO<sub>2</sub>e/GJ.

## F.2. Baseline emissions calculation

The baseline GHG emissions during the year  $y$ , t CO<sub>2</sub>e:

$$BE_y = BE_{RFO,y} + BE_{lignite,y} + BE_{grid,y} + BE_{BWW,dump,y} + BE_{WWS,dump,y},$$

where  $BE_{RFO,y}$  is the baseline emissions of CO<sub>2</sub> from combustion of residual fuel oil in the utilizing boilers during the year  $y$ , t CO<sub>2</sub>e;

$$BE_{RFO,y} = FC_{RFO,BL,y} \times EF_{CO_2,RFO},$$

where  $FC_{RFO,BL,y}$  is the residual fuel oil consumption in the utilizing boilers under the baseline scenario during the year  $y$ , GJ;

$$FC_{RFO,BL,y} = FC_{RFO,9,BL,y} + FC_{RFO,10,BL,y} + FC_{RFO,15,BL,y},$$

where  $FC_{RFO,9,BL,y}$  is the residual fuel oil consumption in boiler No.9 under the baseline scenario during the year  $y$ , GJ,

$$FC_{RFO,9,BL,y} = HG_{9,BL,y} \times SFC_{RFO,9},$$

where  $HG_{9,BL,y}$  is the heat generation by boiler No.9 under the baseline scenario during the year  $y$ , GJ;

$$HG_{9,BL,y} = \text{MIN}(HG_{PJ,y}; HG_9^{\max}),$$

where  $HG_{PJ,y}$  is the heat production by the utilizing boilers under the project during the year  $y$ , GJ;

$$HG_{PJ,y} = HG_{9,PJ,y} + HG_{14,PJ,y} + HG_{15,PJ,y} + HG_{16,PJ,y},$$

where  $HG_{9,PJ,y}$  is the heat generation by boiler No.9 under the project during the year  $y$ , GJ;

$HG_{14,PJ,y}$  is the heat generation by boiler No.14 under the project during the year  $y$ , GJ;

$HG_{15,PJ,y}$  is the heat generation by boiler No.15 under the project during the year  $y$ , GJ;

$HG_{16,PJ,y}$  is the heat generation by boiler No.16 under the project during the year  $y$ , GJ.

$HG_9^{\max}$  is the maximum quantity of heat that can be produced by boiler No.9 during the year, it was assumed:

$$HG_9^{\max} = 1\,125\,026 \text{ GJ [R1, Section B1].}$$

$SFC_{RFO,9}$  is the specific residual fuel oil consumption for generation of 1 GJ of heat in boiler No.9, GJ/GJ, it was assumed:

$$SFC_{RFO,9} = 0.0347 \text{ GJ/GJ [R1, Section B1].}$$

$FC_{RFO,10,BL,y}$  is the residual fuel oil consumption in boiler No.10 under the baseline scenario during the year y, GJ;

$$FC_{RFO,10,BL,y} = HG_{10,BL,y} \times SFC_{RFO,10},$$

where  $HG_{10,BL,y}$  is the heat generation by boiler No.10 under the baseline scenario during the year y, GJ;

$$HG_{10,BL,y} = \text{MIN}((HG_{PJ,y} - HG_{9,BL,y}); HG_{10}^{\max}),$$

where  $HG_{10}^{\max}$  is the maximum quantity of heat that can be produced by boiler No.10 during the year, GJ, it was assumed:

$$HG_{10}^{\max} = 614\,488 \text{ GJ [R1, Section B1].}$$

$SFC_{RFO,10}$  is the specific residual fuel oil consumption for generation of 1 GJ of heat in boiler No.10, GJ/GJ, it was assumed:

$$SFC_{RFO,10} = 0.3672 \text{ GJ/GJ [R1, Section B1].}$$

$FC_{RFO,15,BL,y}$  is the residual fuel oil consumption in boiler No.15 under the baseline scenario during the year y, GJ;

$$FC_{RFO,15,BL,y} = HG_{15,BL,y} \times SFC_{RFO,15},$$

where  $HG_{15,BL,y}$  is the heat generation by boiler No.15 under the baseline scenario during the year y, GJ;

$$HG_{15,BL,y} = \text{MIN}((HG_{PJ,y} - HG_{CHPP2,BL,y}); HG_{15}^{\max}),$$

where  $HG_{CHPP2,BL,y}$  is the heat production by the boilers of CHPP-2 under the baseline scenario during the year y, GJ;

$$HG_{CHPP2,BL,y} = HG_{9,BL,y} + HG_{10,BL,y}.$$

$HG_{15}^{\max}$  is the maximum quantity of heat that can be produced by old boiler No.15 during the year, GJ, is assumed:

$$HG_{15}^{\max} = 1\,339\,346 \text{ GJ [R1, Section B1].}$$

$SFC_{RFO,15}$  is the specific residual fuel oil consumption for generation of 1 GJ of heat in boiler No.15, GJ/GJ, it was assumed:  $SFC_{RFO,15} = 0.2810$  GJ/GJ [R1, Section B1].

$BE_{lignite,y}$  is the baseline emissions of CO<sub>2</sub> from additional combustion of lignite in the boilers of CHPP-6 during the year y, t CO<sub>2</sub>e;

$$BE_{lignite,y} = FC_{lignite,BL,y}^{add} \times EF_{CO_2,lignite},$$

where  $FC_{lignite,BL,y}^{add}$  is the additional lignite consumption at CHPP-6 under the baseline scenario as compared with the project scenario during the year y, GJ;

$$FC_{lignite,BL,y}^{add} = \frac{HS_{CHPP6,BL,y}^{add} \times K_{turbine}^{heat}}{\eta_{boiler} \times (1 - HA_{boiler}) \times K_{HF}},$$

where  $HS_{CHPP6,BL,y}^{add}$  is the additional heat supply from CHPP-6 to end-users under the baseline scenario as compared with the project scenario during the year y, GJ;

$$HS_{CHPP6,y}^{add} = HS_{PJ,y} - HS_{BL,y},$$

where  $HS_{PJ,y}$  is the heat supply to end-users due to operation of the utilizing boilers under the project during the year y, GJ;

$$HS_{PJ,y} = HG_{PJ,y} \times SHS_{THPP,PJ,y},$$

where  $SHS_{THPP,PJ,y}$  is the factor of heat supply from THPP under the project during the year y;

$$SHS_{THPP,PJ,y} = \frac{HS_{THPP,PJ,y}}{HG_{THPP,PJ,y}},$$

where  $HS_{THPP,PJ,y}$  is the heat supply to end-users from THPP under the project during the year y, GJ;

$$HS_{THPP,PJ,y} = HS_y^{total} - HS_{CHPP6,PJ,y},$$

where  $HS_y^{total}$  is the total heat supply (in the form of steam) to end-users from THPP and CHPP-6 during the year y, GJ;

$HS_{CHPP6,PJ,y}$  is the heat supply (in the form of steam) to end-users from CHPP-6 under the project

during the year  $y$ , GJ.

$HG_{THPP,PJ,y}$  is the heat production by the boilers of THPP under the project during the year  $y$ , GJ;

$$HG_{THPP,PJ,y} = HG_{PJ,y} + HG_{CHPP3,y},$$

where  $HG_{CHPP3,y}$  is the heat production by the boilers of CHPP-3 during the year  $y$ , GJ;

$$HG_{CHPP3,y} = HG_{11,y} + HG_{12,y},$$

where  $HG_{11,y}$  is the heat generation by boiler No.11 during the year  $y$ , GJ;

$HG_{12,y}$  is the heat generation by boiler No.12 during the year  $y$ , GJ.

$HS_{BL,y}$  is the heat supply to end-users due to operation of the utilizing boilers under the baseline scenario during the year  $y$ , GJ;

$$HS_{BL,y} = HG_{BL,y} \times SHS_{THPP,BL},$$

where  $HG_{BL,y}$  is the heat production by the utilizing boilers under the baseline scenario during the year  $y$ , GJ;

$$HG_{BL,y} = HG_{9,BL,y} + HG_{10,BL,y} + HG_{15,BL,y}.$$

$SHS_{THPP,BL}$  is the factor of heat supply from THPP under the baseline scenario, it was assumed:  $SHS_{THPP,BL} = 0.705$  [R1, Section B1].

$K_{turbine}^{heat}$  is the factor of variation of live steam flow to the turbine caused by the variation of the process steam extraction. According to energy characteristic of the turbines it was assumed:  $K_{turbine}^{heat} = 1.310$  [R1, Section B1];

$\eta_{boiler}$  is the efficiency factor of CHPP-6 boilers, it was assumed:  $\eta_{boiler} = 0.902$  [R10, page 417];

$HA_{boiler}$  the proportion of heat for auxiliary needs of CHPP-6 boilers, it is assumed:  $HA_{boiler} = 0.0233$  [R11, Table 3];

$K_{HF}$  is the heat flow factor at CHPP-6, it is assumed:  $K_{HF} = 0.98$  [R12, page 135, Fig. 10.2].

$EF_{CO_2, lignite}$  is the CO<sub>2</sub> emission factor for lignite combustion, t CO<sub>2</sub>e/GJ. According to 2006 IPCC Guidelines for National Greenhouse Gas Inventories [R6] for the entire project period it was assumed:  $EF_{CO_2, lignite} = 0.101$  t CO<sub>2</sub>e /GJ.

$BE_{grid, y}$  is the baseline emissions of CO<sub>2</sub> from additional electricity consumption from the external power grid during the year y, t CO<sub>2</sub>e;

$$BE_{grid, y} = EC_{grid, BL, y}^{add} \times EF_{CO_2, grid, y},$$

where  $EC_{grid, BL, y}^{add}$  is the additional electricity consumption from the external power grid under the baseline scenario as compared with the project scenario during the year y, MWh;

$$EC_{grid, BL, y}^{add} = ES_{PJ, y} - ES_{BL, y} - ES_{CHPP6, BL, y}^{add},$$

where  $ES_{PJ, y}$  is the electricity supply due to operation of the utilizing boilers under the project during the year y, MWh;

$$ES_{PJ, y} = ES_{CHPP2, PJ, y} - EC_{BH, PJ, y},$$

where  $ES_{CHPP2, PJ, y}$  is the electricity supply from CHPP-2 under the project during the year y, MWh;

$$ES_{CHPP2, PJ, y} = EG_{CHPP2, PJ, y} - EC_{CHPP2, PJ, y},$$

where  $EG_{CHPP2, PJ, y}$  is the electricity generation at CHPP-2 under the project during the year y, MWh;

$EC_{CHPP2, PJ, y}$  is the electricity consumption for auxiliary needs of CHPP-2 under the project during the year y, MWh.

$EC_{BH, PJ, y}$  is the electricity consumption for auxiliary needs of the boiler house under the project during the year y, MWh.

$ES_{BL, y}$  is the electricity supply due to operation of the utilizing boilers under the baseline scenario during the year y, MWh;

$$ES_{BL, y} = ES_{CHPP2, BL, y} - EC_{BH, BL, y},$$

where  $ES_{CHPP2, BL, y}$  is the electricity supply from CHPP-2 under the baseline scenario during the year y, MWh;

$$ES_{CHPP2, BL, y} = EG_{CHPP2, BL, y} - EC_{CHPP2, BL, y},$$

where  $EG_{CHPP2,BL,y}$  is the electricity generation at CHPP-2 under the baseline scenario during the year  $y$ , MWh;

$$EG_{CHPP2,BL,y} = HG_{CHPP2,BL,y} \times \chi_{CHPP2,BL},$$

where  $\chi_{CHPP2,BL}$  is the factor of heat-production-based electricity generation at CHPP-2 under the baseline scenario, MWh/GJ, it is assumed:  $\chi_{CHPP2,BL} = 0.0372$  MWh/GJ [R1, Section B1].

$EC_{CHPP2,BL,y}$  is the electricity consumption for auxiliary needs of CHPP-2 under the baseline scenario during the year  $y$ , MWh;

$$EC_{CHPP2,BL,y} = HG_{CHPP2,BL,y} \times SEC_{HG,CHPP2,BL},$$

where  $SEC_{HG,CHPP2,BL}$  is the specific electricity consumption for production of 1 GJ of heat at CHPP-2 under the baseline scenario, MWh/GJ, it is assumed:  $SEC_{HG,CHPP2,BL} = 0.0141$  MWh/GJ [R1, Section B1].

$EC_{BH,BL,y}$  is the electricity consumption for auxiliary needs of the boiler house under the baseline scenario during the year  $y$ , MWh;

$$EC_{BH,BL,y} = HG_{BH,BL,y} \times SEC_{HG,BH,BL},$$

where  $HG_{BH,BL,y}$  is the heat production by boilers of the boiler house under the baseline scenario during the year  $y$ , GJ;

$$HG_{BH,BL,y} = HG_{15,BL,y}.$$

$SEC_{HG,BH,BL}$  is the specific electricity consumption for production of 1 GJ of heat in the boiler house under the baseline scenario, MWh/GJ, it is assumed:  $SEC_{HG,BH,BL} = 0.007$  MWh/GJ [R1, Section B1].

$ES_{CHPP6,BL,y}^{add}$  is the additional heat-production-based electricity supply from CHPP-6 under the baseline scenario as compared with the project scenario during the year  $y$ , MWh;

$$ES_{CHPP6,BL,y}^{add} = \frac{HS_{CHPP6,BL,y}^{add} \times K_{turbine}^{electricity} \times (1 - SEC_{auxiliary,CHPP6})}{3.6},$$

where  $K_{turbine}^{electricity}$  is the factor of variation of electricity generation by the turbine caused by the variation of the process steam extraction. In accordance with the energy characteristic of the turbine it was assumed:  $K_{turbine}^{electricity} = 0.305$  [R13, page 95, Table 4.6];

$SEC_{auxiliary,CHPP6}$  is the specific electricity consumption for auxiliary needs of CHPP-6, it is assumed:  $SEC_{auxiliary,CHPP6} = 0.04$  [R12, page 18].

$EF_{CO_2,grid,y}$  is the CO<sub>2</sub> emission factor for electricity consumed from the external power grid, t CO<sub>2</sub>e/MWh. According to Guidelines for Project Design Documents of Joint Implementation Projects [R7, page 43] the CO<sub>2</sub> emission factors for electricity consumed from the power grid in Russia depending on considered year:  $EF_{CO_2,grid}^{2010} = 0.55$  t CO<sub>2</sub>/MWh.

$BE_{BWW,dump,y}$  is the baseline emissions of CH<sub>4</sub> from decomposition of an additional quantity of BWW at the dump during the year y, t CO<sub>2</sub>e;;

The numerical value of  $BE_{BWW,dump,y}$  is determined using the model “*Calculation of CO<sub>2</sub>-equivalent emission reductions from biomass prevented from stockpiling or taken from stockpiles*” developed by “*BTG biomass technology group B.V.*” based on [R8].

$$BE_{BWW,dump,y} = \left(1 - w_{lignin,BWW}\right) \times k_{BWW} \times \frac{C_{BWW}^{db}}{100} \times \left(1 - \frac{W_{BWW}}{100}\right) \times a \times \zeta \times \left(1 - \frac{\varphi}{100}\right) \times (1 - \zeta_{OX}) \times \frac{V_m}{100} \times \rho_{CH_4} \times GWP_{CH_4} \times \sum_{x=2001}^{x=y} \left(BWW_{dump,BL,x}^{m,add} \times e^{-k_{BWW}(y-x)}\right),$$

where  $BWW_{dump,BL,x}^{m,add}$  is the additional disposal of BWW at the dump under the baseline scenario as compared with the project scenario (amount of fresh biomass utilized) during the year x, t;

$$BWW_{dump,BL,x}^{m,add} = \text{MAX} \left(0; FC_{BWW,PJ,x}^m - FC_{BWW,BL}^{m,max} - BWW_{side,PJ,x}^m\right),$$

where  $FC_{BWW,PJ,x}^m$  is the mass BWW consumption in the utilizing boilers under the project during the year x, t;

$$FC_{BWW,PJ,x}^m = FC_{BWW,9,PJ,x}^m + FC_{BWW,14,PJ,x}^m + FC_{BWW,15,PJ,x}^m + FC_{BWW,16,PJ,x}^m,$$

where  $FC_{BWW,9,PJ,x}^m$  is the mass BWW consumption in boiler No.9 under the project during the year x, t;

$FC_{BWW,14,PJ,x}^m$  is the mass BWW consumption in boiler No.14 under the project during the year  $x$ , t;

$FC_{BWW,15,PJ,x}^m$  is the mass BWW consumption in boiler No.15 under the project during the year  $x$ , t;

$FC_{BWW,16,PJ,x}^m$  is the mass BWW consumption in boiler No.16 under the project during the year  $x$ , t.

$FC_{BWW,BL}^{m,max}$  is the maximum quantity of BWW that can be fired in the utilizing boilers under the baseline scenario during the year, t;

$$FC_{BWW,BL}^{m,max} = FC_{BWW,9}^{m,max} + FC_{BWW,10}^{m,max} + FC_{BWW,15}^{m,max},$$

where  $FC_{BWW,9}^{m,max}$  is the maximum quantity of BWW that can be fired in boiler No.9 during the year, t, it is assumed:  $FC_{BWW,9}^{m,max} = 189\,830$  t [R1, Section B1];

$FC_{BWW,10}^{m,max}$  is the maximum quantity of BWW that can be fired in boiler No.10 during the year, t, it is assumed:  $FC_{BWW,10}^{m,max} = 60\,003$  t [R1, Section B1];

$FC_{BWW,15}^{m,max}$  is the maximum quantity of BWW that can be fired in boiler No.15 during the year, t, it is assumed:  $FC_{BWW,15}^{m,max} = 130\,230$  t [R1, Section B1].

$BWW_{side,PJ,y}^m$  is the quantity of BWW supplied to BPPM (for combustion) from the outside companies under the project during the year  $x$ , t.

$w_{lignin,BWW}$  is the lignin fraction of C for BWW, it is assumed:  $w_{lignin,BWW} = 0.25$  [R8, page 43];

$k_{BWW}$  is the decomposition rate constant for BWW, year<sup>-1</sup>, it is assumed:  $k_{BWW} = \ln(1/2)/15 = 0.046$  year<sup>-1</sup> [R8, page 42];

$C_{BWW}^{db}$  is the organic carbon content in BWW on dry basis, %, it is assumed:  $C_{BWW}^{db} = 50\%$  [R8, page 45];

$W_{BWW}$  is the moisture content of BWW, %, it is assumed:  $W_{BWW} = 60\%$  [R8, page 16];

$a$  is the conversion factor from kg carbon to landfill gas quantity, m<sup>3</sup>/kg carbon, it is assumed:  $a = 1.87$  m<sup>3</sup>/kg carbon [R8, page 24];

$\zeta$  is the generation factor, it is assumed:  $\zeta = 0.77$  [R8, page 41];

$\varphi$  is the percentage of the stockpile under aerobic conditions, %, it is assumed:  $\varphi = 10\%$  [R8, page 80];

$\zeta_{OX}$  is the methane oxidation factor, it is assumed:  $\zeta_{OX} = 0.10$  [R8, page 43];

$V_m$  is the methane concentration biogas, %, it is assumed:  $V_m = 60\%$  [R8, page 41];

$\rho_{CH_4}$  is the density of methane,  $\text{kg/m}^3$ , it is assumed:  $\rho_{CH_4} = 0.714 \text{ kg/m}^3$  [R1, Section E4];

$GWP_{CH_4}$  is the global warming potential of methane,  $\text{t CO}_2\text{e/t CH}_4$ , it is assumed:  $GWP_{CH_4} = 21 \text{ t CO}_2\text{e/t CH}_4$  [R8, page 12];

$y$  is the year for which to calculate the  $\text{CO}_2$ -equivalent reduction, year;

$x$  is the year in which fresh biomass is utilized instead of stockpiled, year.

It should be noted that calculation of methane emissions for each year  $y$  uses additional BWW stockpiling data from 2001 onwards. Additional BWW stockpiling data for 2001-2007 were determined as of the date of baseline setting. These data was used for calculation of the baseline emissions of  $\text{CH}_4$  from decomposition of an additional quantity of BWW at the dump during the year  $y$ . Mass BWW consumptions in the boilers were determined using a calculation algorithm. The uncertainty of calculations of additional BWW disposal at the dump in 2001-2007 is close to zero, as for the sake of conservatism maximum values of mass BWW consumption in 2001-2007 were used to determine mass consumption of BWW in boilers No.9, 10 and 15 under the baseline scenario.

Numerical values of BWW mass consumption in boilers No.No.9, 14, 15 and 16 from 2001 till 2007 are given in Table F.2.1.

**Table F.2.1. Mass consumption of BWW in boilers No.No.9, 14, 15 and 16 from 2001 till 2007**

Parameter	Unit	2001	2002	2003	2004	2005	2006	2007
Mass consumption of BWW, total	t	359 318	436 611	440 333	719 357	626 715	698 663	678 832
including:								
Boiler No.9	t	142 290	131 360	158 093	186 365	153 206	192 763	189 830
Boiler No.14	t	-	-	-	215 999	263 572	287 278	271 974
Boiler No.15	t	101 194	122 560	114 575	130 230	23 877	11 122	-
Boiler No.16	t	115 834	182 691	167 665	186 763	186 060	217 500	217 028

Quantity of BWW supplied from the outside from 2001 till 2007 is given in Table F.2.2.

**Table F.2.2. Quantity of BWW supplied from outside companies from 2001 till 2007**

Parameter	Unit	2001	2002	2003	2004	2005	2006	2007
Quantity of BWW supplied to BPPM (for combustion) from outside companies	t	-	-	-	7 127	10 144	18 920	35 798

$BE_{WWS,dump,y}$  is the baseline emissions of CH<sub>4</sub> from decomposition of an additional quantity of WWS at the dump during the year y, t CO<sub>2</sub>e;

The numerical value of  $BE_{WWS,dump,y}$  is determined using the model “*Calculation of CO<sub>2</sub>-equivalent emission reductions from biomass prevented from stockpiling or taken from stockpiles*” developed by “*BTG biomass technology group B.V.*” based on [R8].

$$BE_{WWS,dump,y} = \left(1 - w_{lignin,WWS}\right) \times k_{WWS} \times \frac{C_{WWS}^{db}}{100} \times a \times \zeta \times \left(1 - \frac{\varphi}{100}\right) \times (1 - \zeta_{OX}) \times \frac{V_m}{100} \times \rho_{CH_4} \times GWP_{CH_4} \times$$

$$\times \sum_{x=2010}^{x=y} \left( WWS_{dump,BL,x}^{dry,add} \times e^{-k_{WWS}(y-x)} \right),$$

where  $WWS_{dump,BL,x}^{dry,add}$  is the additional disposal of absolutely dry WWS at the dump under the baseline scenario as compared with the project scenario (amount of fresh biomass utilized) during the year x, t a.d.m.;

$$WWS_{dump,BL,x}^{dry,add} = FC_{WWS,PJ,x}^{dry},$$

where  $FC_{WWS,PJ,x}^{dry}$  is the quantity of absolutely dry WWS fired under the project during the year x, t a.d.m.;

$$FC_{WWS,PJ,x}^{dry} = FC_{WWS,BH,PJ,x}^{dry},$$

where  $FC_{WWS,BH,PJ,x}^{dry}$  is the absolutely dry WWS consumption in the boiler house under the project during the year x, t a.d.m.;

$$FC_{WWS,BH,PJ,x}^{dry} = FC_{WWS,BH,PJ,x}^m \times \frac{100 - W_{WWS,PJ,x}}{100},$$

where  $FC_{WWS,BH,PJ,x}^m$  is the mass WWS consumption in the boiler house under the project during the year x, t;

$W_{WWS,PJ,x}$  is the average moisture content of WWS under the project in the year x, %.

$w_{lignin,WWS}$  is the lignin fraction of C for the WWS, it is assumed:  $w_{lignin,WWS} = 0.25$  [R8, page 43];

$k_{WWS}$  is the decomposition rate constant for the WWS, year<sup>-1</sup>, it is assumed:  $k_{WWS} = 0.185$  [R15, page 6];

$C_{WWS}^{db}$  is the organic carbon content in the WWS on dry basis, %, it is assumed:  $C_{WWS}^{db} = 41\%$  [R16].

It should be noted that calculation of methane emissions for each year y uses additional WWS stockpiling data from 2010 onwards.

### F.3. Leakage calculation

The leakages are equal to zero [R1, Section B3].

### F.4. Emission reductions calculation

GHG emission reductions during the year y, t CO<sub>2</sub>e:

$$ER_y = BE_y - PE_y$$

or

$$ER_y = ER_{CO_2,y} + ER_{CH_4,y},$$

where  $ER_{CO_2,y}$  is the reduction of carbon dioxide emissions during the year y, t CO<sub>2</sub>e.;

$$ER_{CO_2,y} = ER_{CO_2,RFO,y} + ER_{CO_2,lignite,y} + ER_{CO_2,grid,y},$$

where  $ER_{CO_2,RFO,y}$  is the reduction of carbon dioxide emissions from combustion of residual fuel oil in the utilizing boilers during the year y, t CO<sub>2</sub>e;

$$ER_{CO_2,RFO,y} = BE_{RFO,y} - PE_{RFO,y}.$$

$ER_{CO_2,lignite,y}$  is the reduction of carbon dioxide emissions from combustion of lignite in CHPP-6 boilers during the year y, t CO<sub>2</sub>e;

$$ER_{CO_2,lignite,y} = BE_{lignite,y}.$$

$ER_{CO_2,grid,y}$  is the reduction of carbon dioxide emissions from combustion of fossil fuel at grid power plants during the year  $y$ , t CO<sub>2</sub>e;

$$ER_{CO_2,grid,y} = BE_{grid,y} \cdot$$

$ER_{CH_4,y}$  is the reduction of methane emissions during the year  $y$ , t CO<sub>2</sub>e;

$$ER_{CH_4,y} = ER_{CH_4,BWW,dump,y} + ER_{CH_4,WWS,dump,y} \cdot$$

where  $ER_{CH_4,BWW,dump,y}$  is the reduction of methane emissions from BWW decomposition at the dump during the year  $y$ , t CO<sub>2</sub>e;

$$ER_{CH_4,BWW,dump,y} = BE_{BWW,dump,y} \cdot$$

$ER_{CH_4,WWS,dump,y}$  is the reduction of methane emissions from WWS decomposition at the dump during the year  $y$ , t CO<sub>2</sub>e;

$$ER_{CH_4,WWS,dump,y} = BE_{WWS,dump,y} \cdot$$

The calculation method of GHG emission reductions was implemented in the computational model in the form of excel-files (See Annex 2). This model is integral part of the monitoring report. Main results of calculations are summarized in Table F.4.1.

**Table F.4.1. The summary table of GHG emission reductions for 2010**

Parameter	Symbol	Unit	Value
Baseline emissions	$BE_{NG,y}$	t CO <sub>2</sub> e	191 168
Project emissions	$PE_{NG,y}$	t CO <sub>2</sub> e	40 341
GHG emission reductions	$ER_y$	t CO <sub>2</sub> e	<b>150 827</b>

**F.5. Comparison of actual emission reductions with estimates in the PDD**

According to the project design document, GHG emission reductions in 2010 were estimated at 293 005 tCO<sub>2</sub>e. GHG emission reductions according to the monitoring amounted to 150 827 tCO<sub>2</sub>e, which is 142 178 tCO<sub>2</sub>e or 48.5% less than the projected level.

The reasons why the monitored amount of ERUs is lower than the PDD estimation are as follows:

1. Additional electricity consumption from the grid turned out to be higher than the projected level (See Table F.5.1). The assumption was that in 2010 steam from bark and wood waste boilers No.No.14-16, installed in the boiler house, will be supplied via the newly mounted steam pipeline to CHPP-2 turbines (within the framework of the heating scheme modernization project). However in 2010 the new steam pipeline was not installed and thus additional power was not generated. This factor reduced the amount of ERUs by 14.0 % (See Table F.5.2).
2. Reduction in heat supply from bark and wood waste boilers against the projected level<sup>2</sup>. This factor reduced the amount of ERUs by 11.4 %.
3. Increase in heavy fuel oil consumption by bark and wood wastes boilers. This factor reduced the amount of ERUs by 6.8 %.
4. Absence of WWS burning. This factor reduced the amount of ERUs by 4.1 %.
5. Reduction in the quantity of bark and wood wastes prevented from stockpiling in 2010. This factor reduced the amount of ERUs by 3.6 %.

Reduction in the quantity of bark and wood wastes prevented from stockpiling was also recorded in 2008 and 2009 [R17], which decreased emission reductions in 2010 by 5.3% and 3.4% respectively.

**Table F.5.1. Performance of the enterprise in 2010**

Performance	Unit	PDD	Monitoring report
Additional electricity consumption from the power grid	MWh	9 302	83 972
Heat supply from BWW boilers	GJ	2 869 529	2 652 358
Fuel oil consumption by BWW boilers	t	263 142	521 202
WWS burning	t a.d.m	20 122	0
BWW quantity prevented from dumping	t	303 681	160 111

<sup>2</sup> Decrease of heat supply from bark and wood waste boilers against the projected level is explained by lower fuel consumption. It was planned to burn 705 000 tonnes of bark and wood wastes, actually 627 000 tonnes were burnt (decrease 11%). It was planned to burn 20 000 tonnes (absolutely dry substance) of sludge, actually no sludge was burnt.

**Table F.5.2. Impact of various factors on reduction in the amount of ERUs**

Factor	Reduction in ERUs against project values	
	tCO <sub>2</sub> e	%
Increase of electricity consumption from the power grid	-41 069	-14.02
Reduction heat supply from BWW boilers	-33 281	-11.36
Increase of fuel oil consumption by boilers	-19 974	-6.82
Absence of WWS burning	-12 011	-4.10
Reduction in BWW quantity prevented from dumping in 2010	-10 442	-3.56
Reduction in BWW quantity prevented from dumping in 2009	-15 406	-5.26
Reduction in BWW quantity prevented from dumping in 2008	-9 996	-3.41
<b>Total</b>	<b>-142 178</b>	<b>-48.52</b>

CCGS LLC  
01.06.2011



Vladimir Dyachkov - Director of Project Implementation Department



Evgeniy Zhuravskiy, Specialist of Project Implementation Department

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**ANNEX 1**

**The provisions for quality control procedure in relation to preparation of project design documents and monitoring reports for greenhouse gas emission reduction projects at CCGS LLC**



Approved by  
Director General



M. Yulkin  
December 8, 2009

**REGULATIONS**

**on quality check and control of GHG emission reduction project design documents (PDD) and monitoring reports at CCGS LLC**

**1. GENERAL PROVISIONS**

- 1.1. These regulations specify the quality control procedure for development of project design documents (PDDs) and monitoring reports for the projects aimed at GHG emission reduction from sources and/or increase of removal by sinks (hereinafter the "Projects").
- 1.2. The quality control of PDDs and monitoring reports is carried out in conjunction with the structural subdivisions (departments) of CCGS LLC (hereinafter the "Company") and the Project Owners (hereinafter the "Client").
- 1.3. The quality control of PDDs and monitoring reports precedes their submission to an independent auditor for review.

**2. QUALITY CONTROL OF PROJECT DESIGN DOCUMENTS**

- 2.1. The PDD developed by a specialist of the Project Development Department shall undergo the following quality control procedure:
  - 2.1.1. The PDD shall be checked up by the Director of the Project Development Department or, on his instructions, by other specialist of the Project Development Department who was not directly involved in development of this PDD;
  - 2.1.2. Corrective actions shall be taken by the PDD developer and all corrections and amendments shall be agreed with the Director of the Project Development Department;
  - 2.1.3. The PDD shall be checked up by the Director of the Project Implementation Department or, on his instructions, by other specialist of the Project Implementation Department;
  - 2.1.4. Corrective actions shall be taken by the PDD developer and all corrections and amendments shall be agreed with the Director of the Project Implementation Department;

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- 2.1.5. Final check-up and correction of the PDD shall be made by the Director of the Project Development Department;
  - 2.1.6. The PDD shall be submitted to the Client for review;
  - 2.1.7. Corrective actions shall be taken by the PDD developer and all corrections and amendments shall be agreed with the Client and the Director of the Project Development Department and if necessary with the Director of the Project Implementation Department;
  - 2.1.8. The PDD shall be furnished to the Director General and the Client.
- 2.2. Upon completion of the above-described procedure and if there are no comments from the Director General and/or from the Client the PDD shall be deemed ready for determination by an independent auditor. Otherwise the procedure shall be repeated.
  - 2.3. The Director of the Project Development Department shall check all sections of the PDD.
  - 2.4. The Director of the Project Implementation Department shall check those sections of the PDD which describe the project monitoring plan and procedure. Other sections shall be checked by the Director of the Project Implementation Department if necessary or at his discretion.
  - 2.5. The Director General shall take the final decision regarding submission of the PDD for determination to an independent auditor.

### 3. QUALITY CONTROL OF PROJECT MONITORING REPORTS

- 3.1. The project monitoring report prepared by a specialist of the Project Implementation Department shall undergo the following quality control procedure:
  - 3.1.1. The project monitoring report shall be checked up by the Director of the Project Implementation Department or, on his instructions, by other specialist of the Project Implementation Department who was not directly involved in preparation of this project monitoring report;
  - 3.1.2. Corrective actions shall be taken by the monitoring report developer and all corrections and amendments shall be agreed with the Director of the Project Implementation Department;
  - 3.1.3. The project monitoring report shall be checked up by the Director of the Project Development Department or, on his instructions, by other specialist of the Project Development Department;
  - 3.1.4. Corrective actions shall be taken by the monitoring report developer and all corrections and amendments shall be agreed with the Director of the Project Development Department;
  - 3.1.5. Final check-up and correction of the monitoring report shall be made by the Director of the Project Implementation Department;
  - 3.1.6. The monitoring report shall be submitted to the Client for review;
  - 3.1.7. Corrective actions shall be taken by the monitoring report developer and all corrections and amendments shall be agreed with the Client and the Director of the Project Implementation Department and, if necessary, with the Director of the Project Development Department;
  - 3.1.8. The monitoring report shall be submitted to the Director General and the Client.

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- 3.2. Upon completion of the above-described procedure and if there are no comments from the Director General and/or from the Client the monitoring report shall be deemed ready for verification by an independent auditor. Otherwise the procedure shall be repeated.
- 3.3. The Director of the Project Implementation Department shall check all sections of the monitoring report.
- 3.4. The Director of the Project Development Department shall check those sections of the monitoring report which contain results of calculations of GHG emission reductions from sources and/or increase of GHG removals by sinks. Other sections shall be checked up by the Director of the Project Development Department if necessary or at his discretion.
- 3.5. The Director General shall take the final decision regarding submission of the monitoring report for verification to an independent auditor.