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Background and Objectives of the Monitoring Report

According to paragraph 36 of the JI guidelines project participants "shall submit to an accredited independent entity a report in accordance with the monitoring plan on reductions in anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks that have already occurred. The report shall be made publicly available."

The objective of the present monitoring report is to provide the complete, consistent, clear, and accurate calculation of the emissions reductions, within the boundaries of the "Reconstruction of the units at the Structure Unit "Luhanskaya TPP" of the "Skhidenergo" ltd." Joint Implementation Project, for the period 1st January 2008 – 31st December 2009.

SECTION A. General description of the project activity

A.1. Title of the project:

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Title: Reconstruction of the units at the Structure Unit “Luhanskaya TPP” of the “Skhidenergo” ltd.

Sectoral scope 1: Energy industries (non-renewable sources).

Version: 1.2

Date: December 25th, 2010

A.2. JI registration number:

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JI UA 1000206

A.3. Short description of the Project Activity:

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According to the Project Schedule the preparation measures for the TPP Units' Reconstructions were implemented on the TPP during 2008 - 2009. These measures included:

In 2008:

- the sealing bearings №6 and 7 were replaced at the turbine unit of the Unit №10;
- the turbogenerator condenser compensators were repaired at the Unit №10;
- the high-, mid- and low-pressure fittings of the turbogenerator were repaired at the Unit №10;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №10;
- the sealing bearings №6 and 7 were replaced and the journal-bearings №1-7 were repaired at the turbine unit of the Unit №11;
- the turbogenerator condenser compensators were repaired at the Unit №11;

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- the discharge circulating valves reducers were repaired. The discharge circulating valve reducer №1 was replaced at the turbine unit of the Unit №11;
- the high-, mid- and low-pressure fittings of the turbogenerator were repaired at the Unit №11;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №11;
- the RS-type speed controller was replaced at the turbine unit of the Unit №9;
- the pulverized-coal conduits APP № 3, 4, 6, 9 were repaired at the boiler unit of the Unit №9;
- the main and discharge burners were replaced at the boiler unit of the Unit №9;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №9;
- the sealing bearings №6 and 7 were replaced and the journal-bearings №1-7 were repaired at the turbine unit of the Unit №13;
- the acid cleaning of the high-pressure heater was implemented at the turbine unit of the Unit №13;
- the high-, mid- and low-pressure fittings of the turbogenerator were repaired at the Unit №13;
- the smoke exhausters were repaired at the boiler unit of the Unit №13;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №13;
- the thrust bearing №2 was repaired at the turbine of the Unit №14;
- the main and discharge burners were repaired at the boiler unit of the Unit №14;
- the low-pressure cylinder was repaired at the turbine unit of the Unit №15;
- the low-pressure cylinder furnaces were reconstructed at the turbine of the Unit №15 to reach the higher efficiency level;
- the regulating valve №4 of the mid-pressure cylinder at the turbine unit of the Unit №15 was repaired;

- the turbogenerator fittings were repaired at the Unit №15;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №15.

In 2009:

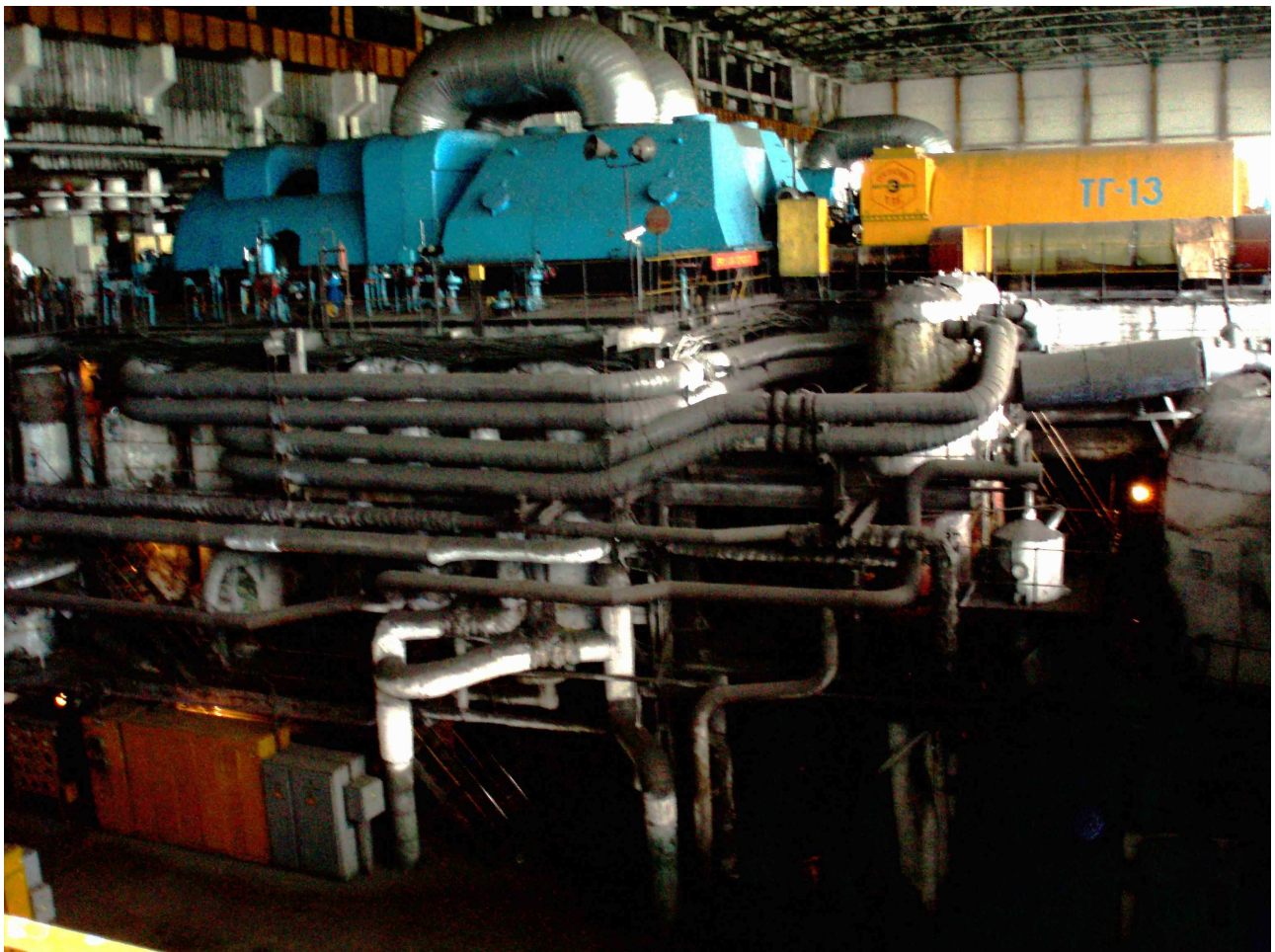
- the generator shaft sealing was repaired including the change of the thrust blocks at the Unit №15;
- the vacuum armature of the turbogenerator was repaired at the Unit №15;
- the low-pressure cylinder was repaired including the replacement of the low-pressure rotor and the furnace and diaphragm sealing at the turbine unit of the Unit №10;
- the quenching girder of the water economizer was cleaned and repaired at the boiler unit of the Unit №10;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №10;
- the vacuum armature of the turbogenerator was repaired at the Unit №9 and the stuffing box seal was changed;
- the drain tank of the turbogenerator was repaired at the Unit №9;
- the heat insulation and the setting of the boiler and the turbine units were reconstructed at the Unit №9;
- the static discharge elimination device was repaired at the turbogenerator rotor of the Unit №9;
- the stages 26 – 31 turbine blades were repaired at the Unit №11;
- the low-pressure cylinder was repaired at the turbine unit of the Unit №11;
- the oil catchers, bow collectors, inner and outer panels of the turbogenerator were repaired at the Unit №11;
- the packing bearings of the turbogenerator were repaired at the Unit №13;

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- the technical and circulating water collectors were repaired at the turbogenerator of the Unit №13;
- the current collecting brushes were changed at the turbogenerator of the Unit №13;
- the sealing bearings №6 and 7 were replaced and the journal-bearings №1-7 were repaired at the turbine unit of the Unit №14;
- the slip rings and 132 junk-rings were replaced at the torbogenerator unit of the Unit №14;
- the turbogenerator gas system was repaired at the Unit №14;

Figure 1 Energy generating Unit №13 of the Luhanskaya TPP



As the result of the foregoing measures, the average Specific Fuel Rate of the energy supplied by the TPP lowered from **0.4379 tef/MWh (12.8305 GJ/MWh)** in the

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Baseline Scenario to 00.4137 tef/MWh (12.1338 GJ/MWh) in 2008 and 0.4186 tef/MWh (12.2775 GJ/MWh) in 2009.

The Annual electricity supply in 2008 was **5 910 992 MWh**.

The Annual electricity supply in 2009 was **5 025 077 MWh**.

A.4. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine	Skhidenergo Ltd.	No
Ukraine	ELTA JSC	No

A.5. Monitoring Period:

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Date of the Monitoring Period Start: 1.01.2008

Date of the Monitoring Period End: 31.12.2009

A.6. Baseline and Monitoring Methodology applied:

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For the Project the own Approach was provided and determined by the AIE. Project uses a baseline and monitoring plan in accordance with “Combined tool to identify the baseline scenario and demonstrate additionality” (Version 02.2)¹.

In the proposed project CO₂ emissions to atmosphere is reduced through the efficiency increase of power generation at the Luhanskaya TPP after the optimisation of the regimes, servicing, fuel preparations, reconstruction of the boiler,

the turbine equipment, the control and regulation system, the electro-generation and the cooling system.

The energy production depends on the demand of the market. The station can increase the energy production at any time. It means that all the additional energy produced during the Project period substitutes the energy, which would have been produced by the TPP, but with the less efficiency and higher GHG emission.

The proposed Approach for the emission reductions' calculation uses the specific fuel rate (*SFR_y*) parameter. This parameter shows the efficiency level of the fuel combustion at the TPP and, consequently, the emissions from the fuel combustion. This parameter is being calculated in the energy units (in tons of the equivalent fuel) and allows seeing the actual picture of the energy efficiency measures provided on the Station.

For the purposes of the Baseline Emission and Emission Reductions calculation the value of the *SFR_y* parameter was fixed on the 0.4389 tef/MWh (12.8305 GJ/MWh) – the average value for the 2003 – 2005. The Baseline Emission is calculated monthly and summarized at the end of the year for the whole lifetime of the Project, taking into account the annual electricity supply and the fuel mix in the specific year.

The Project Emission is also calculated monthly through the whole lifetime of the Project and being summarized at the end of the reporting period. The actual data of the calculated *SFR_y* is used for these purposes.

For the Calculations the value of the Specific Fuel Rate (*SFR*) was used. This parameter is commonly used in energy sector and it shows the fuel (energy) consumption per the electric energy supplied to the grid.

The SFR parameter is calculated using the formula:

$$SFR_y = \frac{\sum (F_{iy} * NCV_{iy})}{7} / AELS_y \quad (1)$$

¹ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf>

Where

SFR_y – specific fuel rate of the power plant in year y , t.e.f./MWh. (GJ/MWh);

F_{iy} – the amount of the fuel i consumed by the power plant in year y , tons (th.m3);

NCV_{iy} – net caloric value of the fuel i in year y , Gcal/ton(th.m3);

7 - the net caloric value of one ton of the equivalent fuel, Gcal;

$AELS_y$ - annual energy supply of the power plant in year y , MWh.

All the data achieved in the calculations is being lowered by the uncertainties and accuracy level of the measuring equipment. (According to the GKD-34.09.103-96, approved by the Ministry of Energy and Electrification of Ukraine in 1996).

It is usually measured in the grams of the equivalent fuel per kW (tons per MW) of the energy supplied to the grid. One ton of the equivalent fuel (tef) is 29.3 GJ or 7 Gcal. The calculation of the SFR shows the fuel consumption irrelative of the type of the fuel. All the amount of the natural fuel is multiplied by the net caloric value of the fuel (specifically consumed) and these values are summed up. The use of the SFR parameter shows the real fuel efficiency of the TPP independent of the fuel quality and the net caloric value and allows comparing the fuel efficiency data of the different time periods.

A.7. Intended deviations or revisions to the determined PDD and Monitoring

Plan:

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There are no deviations to the determined PDD and Monitoring Plan.

A.8. Changes since determination:

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There are some deviations in the values of the Baseline, Project Emissions and the Emission Reductions in the Monitoring Report in comparison with the determined PDD. For instance, the Emission Reductions for the 2008 at the PDD were determined at the level of 392 775 tons of the CO₂ equivalent, but the Monitoring Report represents this value as 381 511 tons of the CO₂ equivalent. In 2009 the value of the Emission Reductions in the PDD was 217 434 tons of the CO₂ equivalent and 266 726 tons of the CO₂ equivalent in the Monitoring Report. These deviations exist because there were the average annual values of the Electricity Supply, Specific Fuel Rate and the Fuel mix used for the calculation of the PDD values. And in the Monitoring Report these calculations were made on the monthly data basis. The monthly calculations give more accurate values of the Baseline Emission, Project Emission and the Emission Reductions.

In the 2009 calculations for the PDD the prediction of the electricity supply was used, but the factual data appeared to be higher thus, the Emissions (Baseline and Project) and the Emission reductions appeared to be higher in comparison to the plan.

A.9. Person(s) responsible for the preparation and submission of the monitoring report:
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Skhidenergo ltd.

- Dyatlov Olexander Yevgenievich, Director for Economic and Finance

ELTA JSC

- Livshits Alexander Lazarevich, President

- Rogovoy Maksym Ivanovich, Deputy Director

SECTION B. Key Monitoring activities

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The project is implemented on the TPP in accordance with technical standards of Ukraine. All the equipment has monitoring and security equipment according to the national energy sector requirements. All the data, needed for the monitoring is collected in the production department of the TPP and accumulated in a specific standard table called “3-tech Form” in accordance with the GKD-34.09.103-96 “The calculation of the reported technical and economical parameters of the power plant concerning the thermal efficiency of the equipment. Methodological tool”, approved by the Ministry of Energy and Electrification of Ukraine in 1996. The main parameters of the Station are measured by the meters and shown in graphs in a real time. The data of the fuel consumption is measured and collected for the whole TPP and the energy produced is measured per each unit separately. This allows to measure the average emission for all the TPP and to see the influence of the Project activity while some of the units are out of operation.

All the starts and stops of each Unit are monitored and also shown in the technical documentation alongside with the working time hours for each Unit of the TPP.

That means, that even when some unit is out of the operation, all the measures continue to be collected and the overall project emission is still being calculated. All the calibrations and checks of the equipment are also documented.

The electricity supply is being monitored by the Electricity Department of the TPP at the central electric panel of the TPP and sent to the Technical Production Department (TPD).

The coal consumption is being monitored daily by the Fuel-Transport Department. The reports are also sent to the TPD.

The heavy fuel oil consumption is being monitored daily by the Boiler-Turbine Department of the TPP. The reports are sent to the TPD.

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The natural gas consumption is being monitored by the Gas Distribution System.

The daily reports are also sent to the TPD.

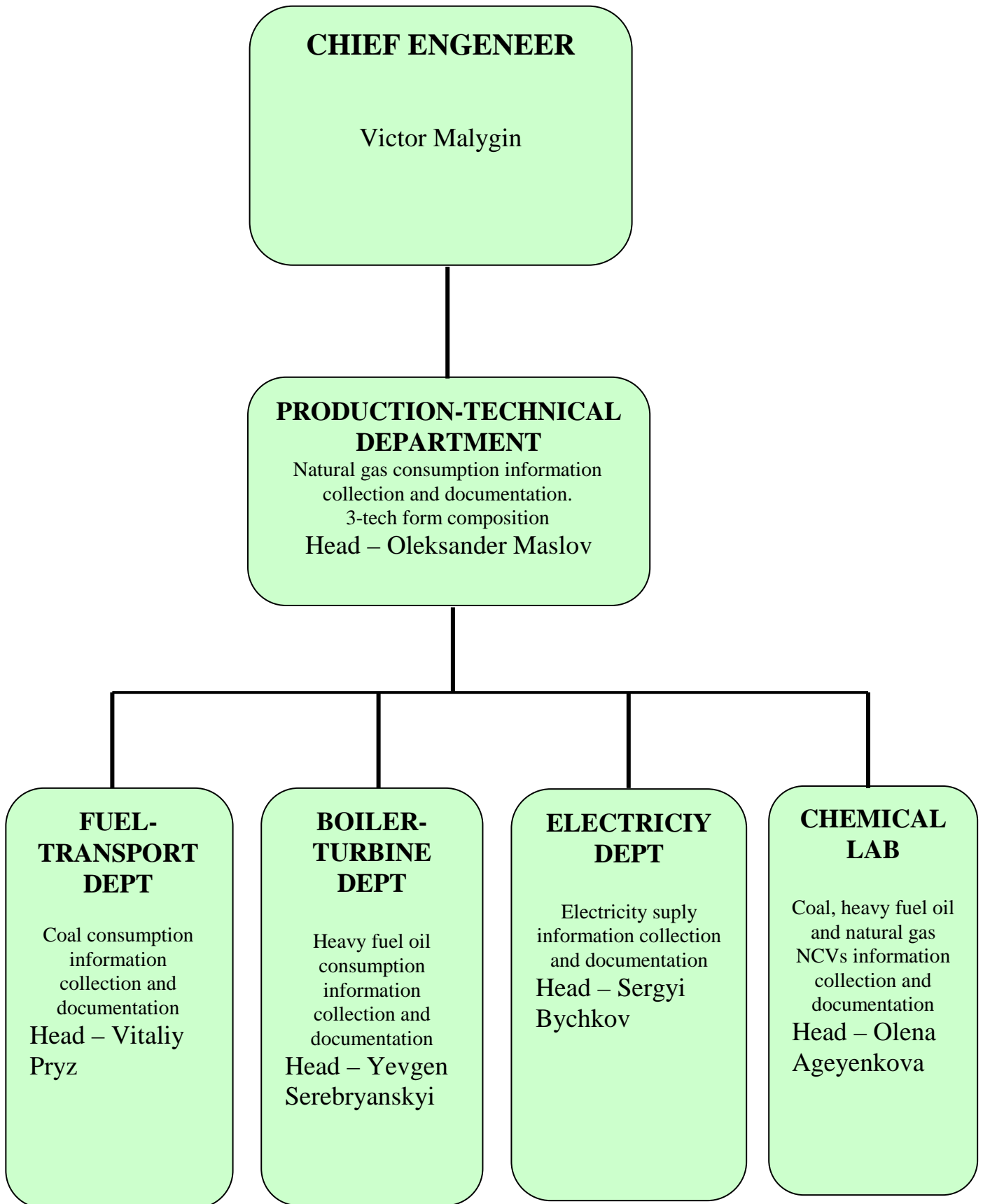
The data of the Net Caloric Value of the fuel is being provided to the TPD by the certified laboratory of the TPP daily.

The TPD collects all the data and calculate the Specific Fuel Rate daily. After that, the data is being summarized in the monthly reports and in the annual report called “3-tech” Form.

All the measures are being sent to the project manager of the “ELTA” company, who collects the data, calculates the emission, emission reductions and creates a monitoring report.

All the data shall be stored in the paper and electronic form at the TPP and in the data base of the “ELTA” company during all lifetime of the project.

B.1. The monitoring information flow at the TPP



B.2. Monitoring equipment.

B.2.1. Electricity supply meters.

As it was mentioned, all the data, needed for the monitoring are shown in the 3-tech form “technical-economic parameters of the equipment operation”. But this information is being crosschecked by the metering equipment indications and calculations. The information about the crosscheck is provided below

Table B.1. The measuring instruments, used for the electricity supply metering in 2008

№	Instrument	Connection	Work parameter	Type of the meter	Serial number	Level of accuracy	Installation date	Date of the last calibration	Date of the next calibration	Calibration organization*
1	2	3	4	5	6	7	8	9	10	11
1	Electricity meter	Peremoga	KW/h	A1R-3-AL-C8-T	1010685	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
2	Electricity meter	Mykhaylivka-1	KW/h	A1R-3-AL-C8-T	1013457	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
3	Electricity meter	Mykhaylivka -2	KW/h	A1R-3-AL-C8-T	1013455	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
4	Electricity meter	Mykhaylivka -3	KW/h	A1R-3-AL-C8-T	1010694	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
5	Electricity meter	Mykhaylivka -4	KW/h	A1R-3-AL-C8-T	1010696	0,2	08.2004y.	08.2004y.	08.2010y.	LCSM
6	Electricity meter	Komunarska-1	KW/h	A1R-3-AL-C8-T	1010690	0,2	08.2004y.	08.2004y.	08.2010y.	

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										LCSM
7	Electricity meter	Komunarska -2	KW/h	A1R-3-AL-C8-T	1010688	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
8	Electricity meter	Kirova-1	KW/h	A1R-3-AL-C8-T	1010700	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
9	Electricity meter	Kirova-2	KW/h	A1R-3-AL-C8-T	1010689	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
10	Electricity meter	Uvileyna	KW/h	A1R-3-AL-C8-T	1010695	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
11	Electricity meter	Lisychanska	KW/h	A1R-3-AL-C8-T	1010687	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
12	Electricity meter	Sysoyevo	KW/h	SL761A071	3604325 5	0,2 S	04.2008y.	03.2008y.	03.2014y.	LCSM
13	Electricity meter	OVV-220 kV	KW/h	A1R-3-AL-C8-T	1010692	0,2	07.2003y.	07.2003y.	07.2009y.	LCSM
14	Electricity meter	ShSOVV-220 kV	KW/h	A1R-3-AL-C8-T	1010691	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
15	Electricity meter	Kosiora	KW/h	A1R-3-AL-C8-T	1010699	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
16	Electricity meter	Kirova	KW/h	A1R-3-AL-C8-T	1013458	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
17	Electricity meter	Luhanska	KW/h	A1R-3-AL-C8-T	1013460	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
18	Electricity meter	Petrovska	KW/h	A1R-3-AL-C8-T	1013459	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
19	Electricity meter	Novoaydarska	KW/h	A1R-3-AL-C8-T	1010693	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM

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20	Electricity meter	Novoaydarska NPS	KW/h	A1R-3-AL-C8-T	1013146	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
21	Electricity meter	Schastya	KW/h	A1R-3-0L-C4-T	1013147	0,2	02.2003y.	02.2003y.	02.2009y.	LCSM
22	Electricity meter	Poliv	KW/h	A1R-3-0L-C4-T	1013154	0,2	02.2003y.	02.2003y.	02.2009y.	LCSM
23	Electricity meter	OVV-110 kV	KW/h	A1R-3-AL-C8-T	1013456	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
24	Electricity meter	KTP-EUM	KW/h	CTK3-10Q2T3Mt	36047	1	10.2006y.	11.2006y.	11.2012y.	LCSM
25	Electricity meter	ZRU 6 kV «Socis Ltd.»	KW/h	CTK3-10Q2T3Mt	36045	1	10.2006y.	11.2006y.	11.2012y.	LCSM
28	Electricity meter	KTP Pischanyi karyer	KW/h	CA4Y-II672M	332417	2	05.2005y.	06.2005y.	06.2009y.	LCSM
29	Electricity meter	KTP DOK	KW/h	CTK3-10Q2H4Mt	36098	1	10.2006y.	11.2006y.	11.2012y.	LCSM
30	Electricity meter	KTP ATC	KW/h	CTK3-10Q2H4Mt	36094	1	10.2006y.	11.2006y.	11.2012y.	LCSM
31	Electricity meter	KTP ABZ	KW/h	CTK3-10Q2H4Mt	36092	1	10.2006y.	11.2006y.	11.2012y.	LCSM
32	Electricity meter	ZTP of the ORS' base	KW/h	CTK3-10Q2H4Mt	36093	1	10.2006y.	11.2006y.	11.2012y.	LCSM
33	Electricity meter	KTP-19	KW/h	CTK3-10Q2H4Mt	36096	1	10.2006y.	11.2006y.	11.2012y.	LCSM
34	Electricity meter	KTP-20	KW/h	CTK3-10Q2H4Mt	36097	1	10.2006y.	11.2006y.	11.2012y.	LCSM
35	Electricity meter	ZTP-16	KW/h	CA4Y-II672M	425506	2	10.2008y.	10.2008y.	10.2014y.	

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8	Electricity meter	Kirova-1	KW/h	A1R-3-AL-C8-T	1010700	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
9	Electricity meter	Kirova-2	KW/h	A1R-3-AL-C8-T	1010689	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
10	Electricity meter	Uvileyna	KW/h	A1R-3-AL-C8-T	1010695	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
11	Electricity meter	Lisychanska	KW/h	A1R-3-AL-C8-T	1010687	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
12	Electricity meter	Sysoyevo	KW/h	SL761A071	3604325 5	0,2 S	04.2008y.	03.2008y.	03.2014y.	LCSM
13	Electricity meter	OVV-220 kV	KW/h	A1R-3-AL-C8-T	1010692	0,2	07.2003y.	07.2003y.	07.2009y.	LCSM
14	Electricity meter	ShSOVV-220 kV	KW/h	A1R-3-AL-C8-T	1010691	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
15	Electricity meter	Kosiora	KW/h	A1R-3-AL-C8-T	1010699	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
16	Electricity meter	Kirova	KW/h	A1R-3-AL-C8-T	1013458	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
17	Electricity meter	Luhanska	KW/h	A1R-3-AL-C8-T	1013460	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
18	Electricity meter	Petrovska	KW/h	A1R-3-AL-C8-T	1013459	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
19	Electricity meter	Novoaydarska	KW/h	A1R-3-AL-C8-T	1010693	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
20	Electricity meter	Novoaydarska NPS	KW/h	A1R-3-AL-C8-T	1013146	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
21	Electricity meter	Schastya	KW/h	A1R-3-0L-C4-T	1013147	0,2	02.2003y.	02.2003y.	02.2009y.	

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										LCSM
22	Electricity meter	Poliv	KW/h	A1R-3-0L-C4-T	1013154	0,2	02.2003y.	02.2003y.	02.2009y.	LCSM
23	Electricity meter	OVV-110 kV	KW/h	A1R-3-AL-C8-T	1013456	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
24	Electricity meter	KTP-EUM	KW/h	CTK3-10Q2T3Mt	36047	1	10.2006y.	11.2006y.	11.2012y.	LCSM
25	Electricity meter	ZRU 6 kV «Socis Ltd.»	KW/h	CTK3-10Q2T3Mt	36045	1	10.2006y.	11.2006y.	11.2012y.	LCSM
28	Electricity meter	KTP Pischanyi karyer	KW/h	CA4Y-II672M	332417	2	05.2005y.	06.2005y.	06.2009y.	LCSM
29	Electricity meter	KTP DOK	KW/h	CTK3-10Q2H4Mt	36098	1	10.2006y.	11.2006y.	11.2012y.	LCSM
30	Electricity meter	KTP ATC	KW/h	CTK3-10Q2H4Mt	36094	1	10.2006y.	11.2006y.	11.2012y.	LCSM
31	Electricity meter	KTP ABZ	KW/h	CTK3-10Q2H4Mt	36092	1	10.2006y.	11.2006y.	11.2012y.	LCSM
32	Electricity meter	ZTP of the ORS' base	KW/h	CTK3-10Q2H4Mt	36093	1	10.2006y.	11.2006y.	11.2012y.	LCSM
33	Electricity meter	KTP-19	KW/h	CTK3-10Q2H4Mt	36096	1	10.2006y.	11.2006y.	11.2012y.	LCSM
34	Electricity meter	KTP-20	KW/h	CTK3-10Q2H4Mt	36097	1	10.2006y.	11.2006y.	11.2012y.	LCSM
35	Electricity meter	ZTP-16	KW/h	CA4Y-II672M	425506	2	10.2008y.	10.2008y.	10.2014y.	LCSM

In 2009 Luhanskaya TPP supplied to the National Grid **5 025 077** MW/h of the electrical energy.

* - See Section B.2.3 QA/QC

B.2.2. Fuel consumption

TableB.3. Coal scales used in 2008.

№	Instrument	Work parameter	Type of the meter	Serial number	Accuracy level	Installation date	Date of the last calibration	Date of the next calibration	Calibration organization
1	Conveyor weigher	т	VK 230 - 1400	197	± 0,5 1%	25.12.2007	23.12.2008	05.03.2009	Methrologist of the TA and C Depr
2	Conveyor weigher	т	VK 230 - 1400	198	± 0,5 1%	25.12.2007	23.12.2008	05.03.2009	Methrologist of the TA and C Depr

In 2008 Luhanskaya TPP consumed **2 999 600** tons of coal.

TableB.4. Coal scales used in 2009.

№	Instrument	Work parameter	Type of the meter	Serial number	Accuracy level	Installation date	Date of the last calibration	Date of the next calibration	Calibration organization
1	Conveyor weigher	т	VK 230 - 1400	197	± 0,5 1%	25.12.2007	15.12.2009	14.03.2010	Methrologist of the TA and C Depr
2	Conveyor weigher	т	VK 230 - 1400	198	± 0,5 1%	25.12.2007	15.12.2009	14.03.2010	Methrologist of the TA and C Depr

In 2009 Luhanskaya TPP consumed **2 471 393** tons of coal.

The heavy fuel oil consumption per period is defined by the stationary measuring instrument (log scale), which is mounted on the each heavy fuel oil tank in accordance with the project. According to the calibration table of the each tank, the heavy fuel oil level, measured

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with the log scale, is evaluated into the heavy fuel oil level in tons. The difference between the levels, measured at the beginning and the end of the period, shows the heavy fuel oil consumption in the period. In 2008 **2 133** tons of the heavy fuel oil were consumed at the Luhanskaya TPP; in 2009 - **11 747** tons.

The natural gas consumption is measured by the meter, which is mounted at the AGDS owned by the “Luhanskgas” Company and fixed by signing by the Luhanskaya TPP, “Luhanskgas” Company a monthly act. In 2008 Luhanskaya TPP consumed **32 264 000** m³ of the natural gas; in 2009 – **17 466 000** m³ of the natural gas.

B.1.3. QA/QC:

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The equipment calibration is done by the organizations, shown in the tables B.1 and B.2 in the following way:

* LCSM – Luhansk SCSMS

B.3. The List of values, used for the GHG emission reduction calculation::

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Table B.5. Default values

Data variable	Source of data	Data unit	Value / Comment
<i>OXID_{iy}</i> Oxidation factor of the fuel i in year y	IPCC 1996	Share of the fuel oxidised (%)	estimated : coal – 0.98 (98%); heavy fuel oil – 0.99 (99%); natural gas – 0.995 (99.5%).
<i>EF_{iy}</i> Emission factor of the fuel i in year y	IPCC 1996	tCO ₂ / TJ	estimated: coal – 96 tCO ₂ /TJ (sub-bituminous coal); heavy fuel oil – 77 tCO ₂ /TJ natural gas – 56 tCO ₂ /TJ
<i>SFR_b</i> Specific Fuel Rate in the Baseline Scenario	Project Design Document	tef / MWh (GJ / MWh)	0.4379 tef / MWh (12.8305 GJ / MWh)

Table B.6. Variables

Data variable	Source of data	Data unit	Value / Comment
<i>SFR_y</i> Specific Fuel Rate in year y	Calculated and fixed in the 3-tech Form	tef / MWh (GJ / MWh)	The average value for 2008 is 0.4137 tef / MWh (12.1214 GJ / MWh); In 2009 – 0.4186 tef / MWh (12.2650 GJ / MWh)
<i>SF_{iy}</i> The share of fuel i consumed for energy production in year y	Calculated and fixed in the 3-tech Form	Share (%)	For 2008: Coal – 98.4%; Heavy fuel oil – 0.1%. Natural gas – 1.5%. For 2009:

			Coal – 98.3%; Heavy fuel oil – 0.8%. Natural gas – 0.9%.
<i>AELSy</i> The amount of the electricity supplied to the grid in year y	3-tech form and Electricity meters (counters)	MWh	For 2008: 5 910 992 MWh. For 2009: 5 025 077 MWh

B.3. Leakage:

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Not applicable.

B.4. Environmental impacts:

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According to the current Ukrainian laws and requirements the measurement of the pollution of dust, soot, NO_x, CO, etc. should be monitored and documented. These parameters are reflected in the standard form 2TP-Air (the latest edition was approved by the National Statistics Committee of Ukraine Order #223 dated 30.06.2009). The TPP also receives the Pollution Permission from the Ministry of the Environmental Protection of Ukraine.

B.5. Sustainable Development

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The Project implementation is very important for the region and also for the whole energy sector of Ukraine. The Project significantly improve the ecological situation due to the specific fuel rate lowering and the implementation of the new gas-purification system. All that leads to the GHG emission lowering as far as the pollution level lowering. Besides, the Project is the leading and the pioneer one in the technological level and the equipment usage. It sets the reference point for the whole energy sector of Ukraine. The Project significantly improves the quality of the energy produced and the reliability of its supply. Moreover, the Project creates new jobs for the high qualification personnel in the region.

SECTION C. Calculations of the GHG emission reductions
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C.1. <u>Project emission:</u>

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The calculation of the Project Emission (*PE_y*) is made using the formula:

$$PE_y = \sum(SFR_y * SF_{iy} * OXID_i * EFi) * AELS_y,$$

where:

PE_y – Project emission in year *y* (tons CO₂);

SFR_y – specific fuel rate of the station in year *y* (GJ/MWh);

SF_{iy} – share of fuel *i* (coal, natural gas or a heavy fuel oil), consumed in year *y*;

OXID_i - oxidation factor of the fuel *i*;

EF_i - emission factor of the fuel *i* consumed (tons CO₂/GJ);

AELS_y - the amount of the electricity supplied to the grid in year *y* (MWh).

The calculations are made on the monthly basis and the final result is the sum of the monthly calculations.

Table C.1. Project emission in 2008

Period	Project Emission (tons of CO2 equivalent)
<i>January</i>	649 265
<i>February</i>	572 851
<i>March</i>	607 237
<i>April</i>	562 193
<i>May</i>	507 416
<i>June</i>	508 343
<i>July</i>	592 591
<i>August</i>	639 874
<i>September</i>	538 193
<i>October</i>	486 800
<i>November</i>	474 635
<i>December</i>	568 985
Total 2008	6 708 742

Table C.2. Project emission in 2009

Period	Project Emission (tons of CO2 equivalent)
<i>January</i>	558 239
<i>February</i>	437 457
<i>March</i>	460 734
<i>April</i>	328 543
<i>May</i>	289 296
<i>June</i>	389 868
<i>July</i>	433 658
<i>August</i>	506 135
<i>September</i>	629 581
<i>October</i>	505 334
<i>November</i>	575 352
<i>December</i>	653 509
Total 2009	5 767 793

The example of the monthly calculation:

In March 2008 Luhanskaya TPP supplied to the Grid 538 720 MWh (*AELS*) of the electrical energy. The Specific Fuel Rate (*SFR*) this month was 0.4104 tef/MWh (12.0247 GJ / MWh). The fuel mix combusted (*SFi*) in March was – coal – 99%; heavy fuel oil – 0.2%; natural gas – 0.8%. Thus Project Emission (*PE*) in March was:

$$PE = ((12.0247 * 0.99 * 0.98 * 0.096) + (12.0247 * 0.002 * 0.99 * 0.0774) + (12.0247 * 0.008 * 0.995 * 0.0561)) * 538 720 = 607 237 \text{ tons of CO2 equivalent.}$$

C.2. Baseline emission:

>>

The calculation of the Baseline Emission (*BE_y*) is made using the formula:

$$BE_y = \sum (SFR_b * SF_{iy} * OXID_i * EFi) * AELS_y ,$$

where:

BE_y – Baseline emission in year y (tons CO₂);

SFR_b – specific fuel rate of the station in the Baseline Scenario (GJ/MWh);

SF_{iy} – share of fuel *i* (coal, natural gas or a heavy fuel oil), consumed in year y;

OXID_i - oxidation factor of the fuel *i* in year y;

EF_i - emission factor of the fuel *i* consumed in year y (tons CO₂/GJ);

AELS_y - the amount of the electricity supplied to the grid in year y (MWh).

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The calculations are made on the monthly basis and the final result is the sum of the monthly calculations.

Table C.3. Baseline Emission in 2008

Period	Baseline Emission (tons of CO2 equivalent)
<i>January</i>	689 659
<i>February</i>	614882
<i>March</i>	646 196
<i>April</i>	596 058
<i>May</i>	534 839
<i>June</i>	529 457
<i>July</i>	611 525
<i>August</i>	660 769
<i>September</i>	568 887
<i>October</i>	519 217
<i>November</i>	503 042
<i>December</i>	615 722
Total 2008	7 090 254

Table C.4. Baseline Emission in 2009

Period	Baseline Emission (tons of CO2 equivalent)
<i>January</i>	595 964
<i>February</i>	462 131
<i>March</i>	489 489
<i>April</i>	343 926
<i>May</i>	300 823
<i>June</i>	404 238
<i>July</i>	441 486
<i>August</i>	517 617
<i>September</i>	652 756
<i>October</i>	526 738
<i>November</i>	610 610
<i>December</i>	688 742
Total 2009	6 034 519

The example of the monthly calculation:

In March 2008 Luhanskaya TPP supplied to the Grid 538 720 MWh (*AELS*) of the electrical energy. The Specific Fuel Rate (*SFR*) this month was 0.4379 tef/MW (12.8305 GJ / MW). The fuel mix combusted (*SFi*) in March was – coal –

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99%; heavy fuel oil – 0.2%; natural gas – 0.8%. Thus Baseline Emission (*PE*) in March was:

$$BE = ((12.8305 * 0.99 * 0.98 * 0.096) + (12.8305 * 0.002 * 0.99 * 0.0774) + (12.8305 * 0.008 * 0.995 * 0.0561)) * 538\ 720 = 646\ 196 \text{ tons of CO}_2 \text{ equivalent.}$$

C.3. Leakage:

>>

Not applicable.

C.4. Emission Reductions:

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$$ER_y = BE_y - PE_y \text{ ,}$$

Where:

ER_y – emission reductions achieved by the project activity in year *y*;

BE_y – baseline CO₂ emission in year *y*;

PE_y – project CO₂ emission in year *y*.

The example of the monthly calculation:

In March 2008 the baseline emission (*BE*) were 646 196 tons of CO₂ equivalent. The Project emission for that period were 607 237 tons of CO₂ equivalent. Thus, the emission reductions in march 2008 were: $ER = 646\ 196 - 607\ 237 = 38\ 959$ tons of CO₂ equivalent.

Table C.5. Emission Reductions in 2008

Period	Emission Reductions (tons of CO ₂ equivalent)
<i>January</i>	40 394
<i>February</i>	42 031
<i>March</i>	38 959
<i>April</i>	33 866
<i>May</i>	27 423
<i>June</i>	21 115
<i>July</i>	18 574
<i>August</i>	20 895
<i>September</i>	30 695
<i>October</i>	32 417
<i>November</i>	28 407

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<i>December</i>	46 737
Total 2008	381 511

Table C.6. Emission Reductions in 2009

Period	Emission Reductions (tons of CO2 equivalent)
<i>January</i>	37 635
<i>February</i>	24 674
<i>March</i>	28 754
<i>April</i>	15 384
<i>May</i>	11 527
<i>June</i>	14 370
<i>July</i>	7 828
<i>August</i>	11 485
<i>September</i>	23 175
<i>October</i>	21 403
<i>November</i>	35 258
<i>December</i>	35 233
Total 2009	266 726